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THE IRON AGE

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WAREHOUSE STOCKS IN 34 IMPORTANT INDUSTRIAL CENTERS

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▲▲▲ THE IRON AGE ▲▲▲

JULY 13, 1939

ESTABLISHED 1855 Vol. 144, No. 2

"Why Worry About the Machine?"

ONE of our contemporaries seems a bit perturbed over THE IRON AGE's current campaign in defense of mechanization. It devotes a page in a recent issue to asking the question: "Why Worry About the Machine?"

We admit that the abolition of worry, like the abolition of poverty and of the need of working for a living, is an enticing subject. Why worry about Hitler, or cotton surpluses or the Japanese beetles? In fact, why worry about anything? Why not adopt that pleasant point of view embodied in the injunction "Eat, drink and be merry, for tomorrow we die"?

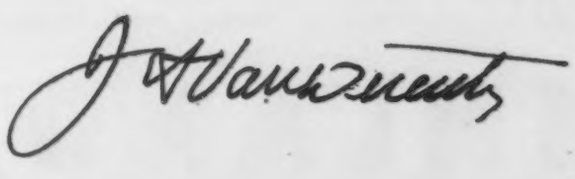
Even those sybarites who attempted to banish care by this formula must have been worried a bit about the future, or they would not have mentioned the fatal tomorrow. They would have let it go at "Eat, drink and be merry."

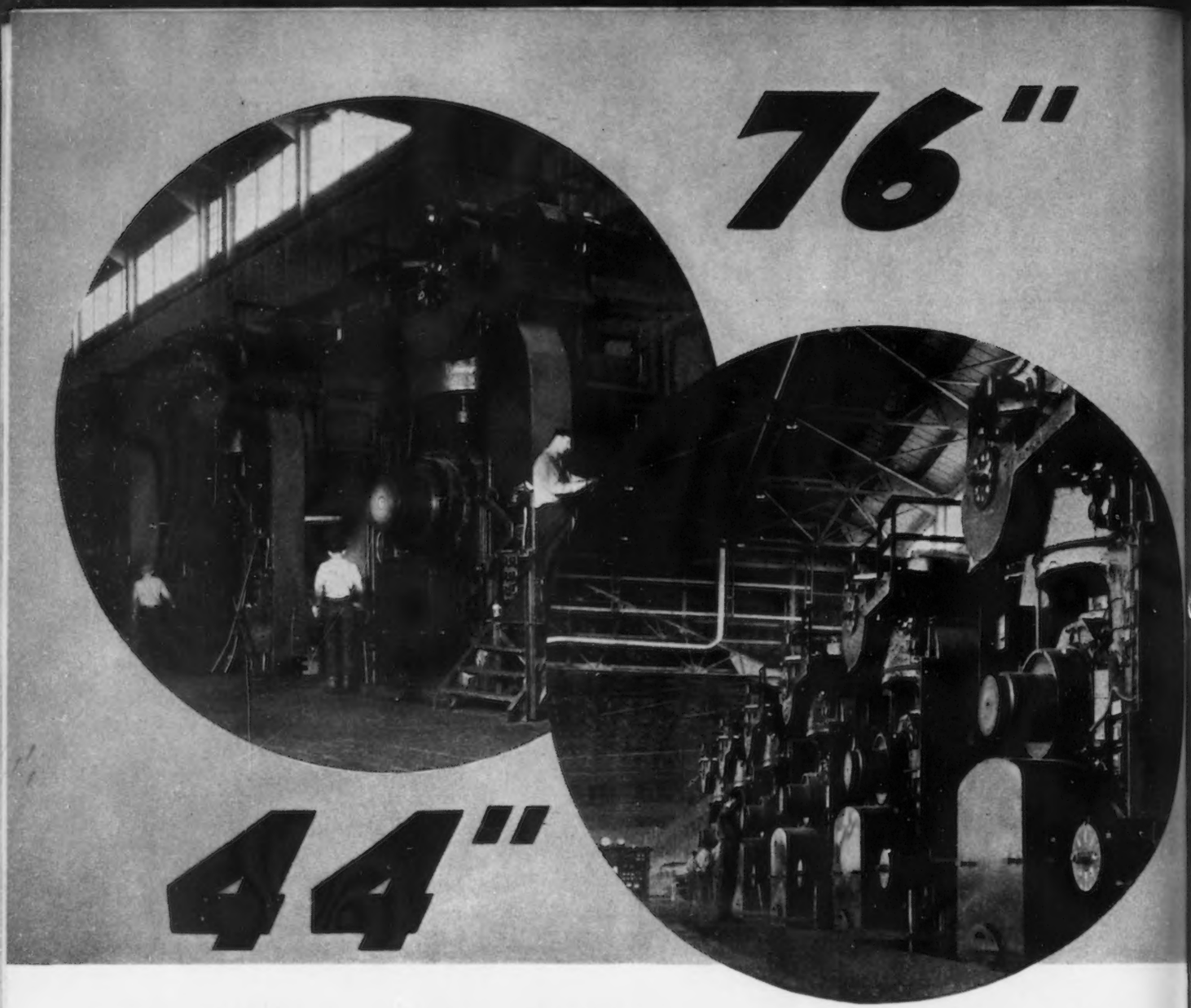
As a matter of fact, in this world of ours, worry is the fuse that lights the firecracker of action. Show me a man who has never done any worrying and I will bet my bottom dollar that his record of accomplishment is either a zero or a minus quantity.

Louis Pasteur started to push the science of medicine ahead when he began to worry about rabies and typhoid fever. Columbus did his share of worrying before he got to the new continent. Our pioneer forefathers worried about the Indians and cold and hunger and grizzly bears. It they hadn't, they would have lost their scalps or have frozen or starved to death or been eaten and we would not be here today.

"Why worry about the machine?" Isn't it worth worrying about? Ask the man who makes one and the man who owns one. They know that worry is a necessary and essential factor in the art of staying in business and making a profit. And in the equally necessary and difficult task of defending a position attained by a company, an individual or an industry.

So we bid our contemporary, in all kindness, not to worry about the worrying that we are doing about the attack on mechanization and improvement. Nor to worry because we are getting machinery builders and users to do some worrying with us on this subject. It is just the necessary prelude to the positive, constructive action that ensues when enough energetic and determined men conclude that a real job must be done.





Two Modern Strip Mills are Teamed Together for Better Service to Inland Customers

In 1932 Inland installed one of the country's first wide continuous strip mills. This 76" unit now has a new running mate . . . . one of the country's highest speed mills, capable of rolling a mile of steel a yard wide in 2½ minutes.

This new 44" mill increases Inland's flat rolled steel capacity 45,000 tons per month, greatly expanding our facilities for prompt service to customers. Its higher speed and numerous improved mechanical features also permit more effective control over quality and uniformity of output.

Temperature control, for example, is made automatic as the hot strip enters the finishing stands, by an electric pyrometer which "looks" at the steel, records its temperature and sounds a warning if there is any variation.

Important also to steel buyers is the fact that this new mill is matched with equally modern steel making and finishing equipment . . . all of it new within the past few years, from blast furnace and open hearths to cold finishing mills, annealing furnaces, tin mills and galvanizing department.

We are confident that these new facilities now enable us to produce, not only more, but better sheets and strip. Your nearest Inland office will make this improved service promptly available to you.

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SHEETS STRIP TIN PLATE BARS PLATES FLOOR PLATES STRUCTURALS PILING RAILS TRACK ACCESSORIES REINFORCING BARS

Why Buy NEW MACHINE TOOLS?

By J. R. WEAVER

Director, Equipment, Inspection and Test, Westinghouse Electric & Mfg. Co.

WHY do we buy machine tools? Last year the Westinghouse Co. spent approximately $5,000,000 on new machine tools and manufacturing equipment, and this year has already spent about $2,000,000. The primary reason for buying new tools on the part of any progressive manufacturing industry is, of course, to give its customers high-quality products at competitive prices. Other reasons are the creation of new products, redesign of existing products, shortening of the work week, and increased labor rates.

The product engineer is continually redesigning his product, whether it be motor, automobile, refrigerator or what not, for the purpose of increasing its efficiency, reducing cost, or building into it sales appeal. In the redesign, one of the major requirements is to build a better product for the same money or an equivalent product for less money. Naturally, the equipment and tool engineer is called into the picture to make his contribution to meet these requirements.

The automotive industry and the refrigerator industry, for example, require new tooling programs every year, not only for the purpose of reducing the cost of the product but primarily because the engineer has brought out a new design which has certain features in it that make it a better product, and these particular features cannot be produced on the same equipment economically. Hence the necessity for new machine tools. True, in order to justify this added investment, there must be savings. These savings are principally due to the design of the product and not to the installation of the new machine tool.

Electrical engineers may redesign motors, changing some part so that instead of its being made on a turret lathe, it can be produced more economically on a multiple-spindle screw machine. That naturally obsoletes the turret lathe and requires the purchase of a multiple-spindle screw machine. Many examples of this kind could be given because the design engineer is continually improving his product to make it more efficient and to increase sales. The purchase of equipment to produce it may be only incidental.

When improvements in products are considered, it is important to note as a contributing factor those products that are the influencing factor on other products, as for instance measuring equipment. Today, an unskilled operator can measure to a higher degree of accuracy than was possible 25 or 30 years ago by the most skilled mechanic. The fact that it is possible to measure on a production basis to a higher degree of accuracy again makes necessary the installation of improved equipment that can meet these greater accuracies. Recently, the writer saw a practical shop measuring device that would measure to a millionth of an inch. The machine tool manufacturers will have to develop machine tools capable of producing such accuracies. Again, it will mean replacement of present equipment with equipment that is superior to anything being produced now.

The writer currently has doubts as to whether anyone can give an accurate definition of "surface quality." In other words, "how smooth is smooth?" Before a standard can be established, a method of measuring is needed. Some progress has been made in developing measuring instruments for measuring smoothness. As these instruments are developed so that they can be used practically in the shop, it will be necessary for the machine tool to produce finishes to a measured standard. Product engineers will again be able to improve their design and improve the efficiency by being able

From an address by Mr. Weaver at the recent fourth annual Machine Tool Electrification Forum, sponsored by the Westinghouse company.

o o o

TODAY, unskilled workers measure more accurately than a skilled mechanic did 25 years ago. Here, the gage measures end-play in a completed shaver motor. The maximum "play" must not exceed 0.001 in.

o o o

definitely to specify smoothness or surface finish.

Production and Purchasing Power

Many events during the last seven or eight years will have a great influence on replacing old machine tools and the necessity for new equipment. There must be a definite relation between purchasing power of the individual and costs of a product. If the purchasing power of 1929 were compared with that of today, it would undoubtedly be found that the dollar went a great deal further in 1929. Apparently, this relation of purchasing power to cost has been definitely disturbed so that today the standard of living has been reduced. The contributing factors to this reduced standard of living might be, for instance, the shorter work week, which has been established at 40 hr. instead of 48 hr. With the same equipment, a workman cannot produce as much work in 40 hr. as he did previously in 48; therefore, there is less production per employee.

Also, during this same time, wages have been increased. This is also added to the cost, as well as all these added taxes so frequently in the news. All of these things have contributed to the unbalance of production and purchasing power. There is only one way to bring them back to the same relationship as in 1929 or to improve this relationship, and that is by increasing human efficiency. Human efficiency can be increased by better manufacturing equipment. Therefore, as far as the manufacturing industry is concerned, maybe all of these supposed mistakes that the nation has made during the last five or six years might prove to be of great advantage.

In the past, during periods of low activity, the search has been for a new product that would pull the country out of the depression. This time, it might be the correcting of these scrambled basic conditions that establish the country's standard of living.

Less Skilled Labor

The machine tool and the tool engineer have been gradually transferring the skill of the mechanic from the man to the machine. In many operations today requiring the highest accuracy, unskilled or semi-skilled labor with adequate equipment has been able to meet the demand. For this reason, during the last 10 years, there has been a certain amount of curtailment in the training of skilled help. As business improves and activities increase in the shops, there will again be a shortage of skilled help. New machine tools and manufacturing equipment will have to be developed to reduce the need for great skill.

Such trends are definitely here, and will continue to grow. Progressive industries have recognized them and taken steps to meet the demands.

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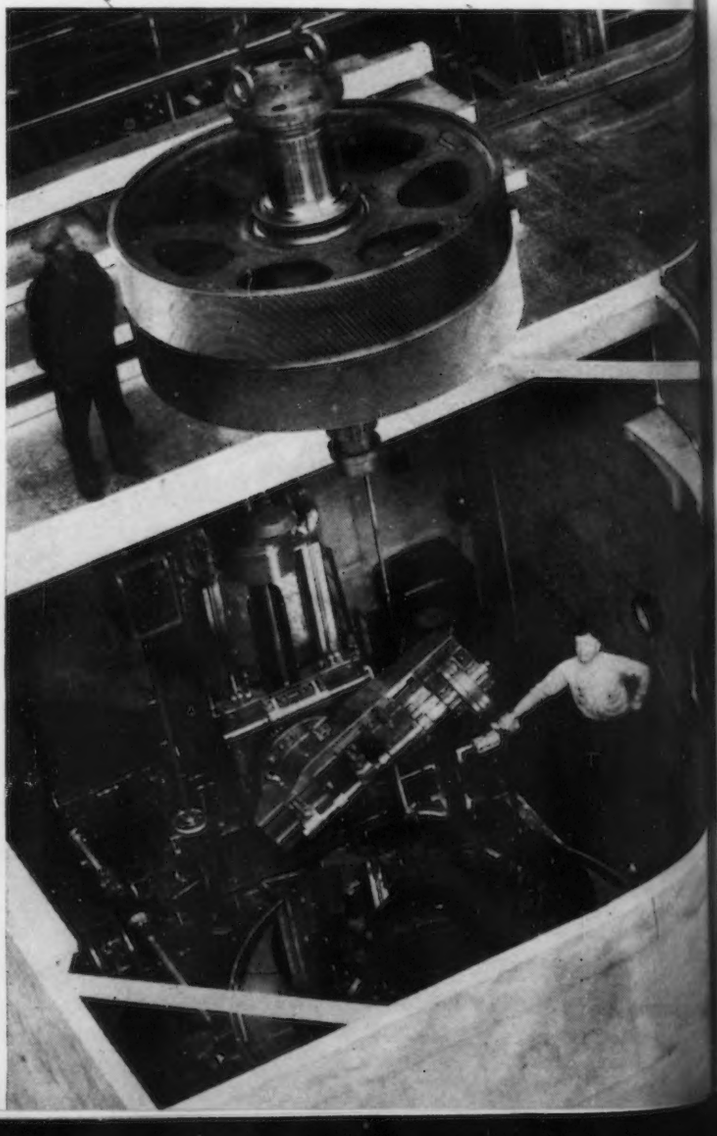
MACHINE tools are meeting the special needs of industry; for example, gears are being cut in air-conditioned rooms for increased accuracy, as shown here.

o o o



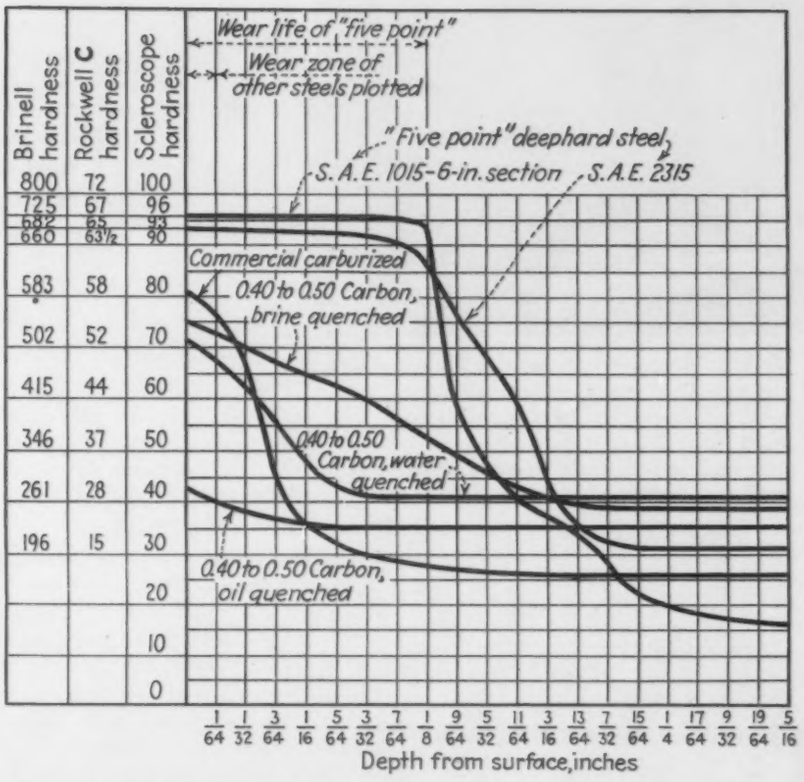
"FIVE-POINT" DEEPHARD STEEL

THE descriptive term "Five-Point" Deephard Steel is the registered trade-mark of any steel regardless of SAE analysis, manufactured and processed by Foote Brothers Gear & Machine Corp. by means of a special process to impart high surface hardness, great depth of hardness, and gradual fusion of this hardness with the core area.

Many of the products made by Foote Brothers, such as gears of all sizes, speed reducers, shafts, and similar products, require more than a light surface hardness depth of 0.020 to 0.030 in., and once in a great while more than 0.040 in. In the majority of applications these products have to withstand great surface abrasion, and occasionally very high or constant repetitive shocks, and heavy material stresses, all of which tend to induce spalling, fatigue, or impact failure because of too thin a surface hardness or a poor and insufficient bond or fusion between the hardness zone and the core area. There has thus been a necessity of developing a process to give hardness depths of from 0.187 to 0.250 in., of obtaining the maximum surface hardness which can be secured with a spall-resisting grain structure, and, equally important, of obtaining a gradual and even fusion of this hardness with the core area.

By means of the recently developed "Five-Point" hardening procedure, surface hardnesses are said to be obtained which range consistently from 60 to 68 Rockwell C, depending on the analysis of the steel. Furthermore, hardness uniformity has been quite satisfactory. Hardened surfaces, as for example a surface 6 x 9 in., have been tested over their full surface on a Rockwell machine, with readings taken ½ in. apart in both directions. The maximum variance noted on any piece tested was two to three points, according to the company, while on the majority of tests the degree of hardness obtained was practically even throughout the entire surface.

Complete control of carbon impregnation is said to be afforded by the process. As a result, it is possible to set a limit of 1.15 carbon throughout, although for most applications this content is restricted to limits of 0.93 to 1.10 C. With impregnation periods shorter in duration than would be necessary with carburizing, it is said that depths of wearing surface hardness up to 0.320 in. have been obtained. While no effort has been made to go beyond this depth, results obtained to date indicate that this is entirely possible and would require no special technique other than a proportionate increase in the period of carbon impregnation. On the other hand, these fast and penetrating qualities are said not to add any difficulties to obtaining a minimum depth of hardness; for every-day hardness depths as light as 0.020 in. are being turned out.



PENETRATION of "wear life" hardness in "Five-Point" Deephard Steel, as compared with carburized steel and high-carbon "hardened processed" steels.

In the gradual drop of hardness and the even rate of its fusion with the core area that is obtained with "Five-Point" Deephard Steel, as shown in the accompanying illustration, two benefits of material value are obtained—a self-supporting zone of hardness is secured which, in addition to the strength it adds to the hardened part as a whole, acts as a support to the wearing surface zone of hardness, materially strengthening the latter.

Going beyond the development of the "Five-Point" process and its application to all SAE low-carbon steels, Foote Brothers has collaborated with a large alloy mill in developing a special analysis of steel which, when processed by the "Five-Point" Deephard Steel process, will produce in a commercial steel an extremely satisfactory combination of high surface hardness and of high strength. The result of this joint development is a nickel-molybdenum steel which, when processed, shows the following core physical properties obtained with a 1-in. round sample: 156,000 lb. per sq. in. yield point; 216,000 lb. per sq. in. ultimate strength; 11 per cent elongation in 2 in.; 29.8 per cent reduction of area; Izod of 25 ft.-lb.; a surface Brinell hardness of 725; a ¼-in. section Brinell hardness of 495; and a core hardness of 429.

THE IRON AGE

JULY 13, 1939

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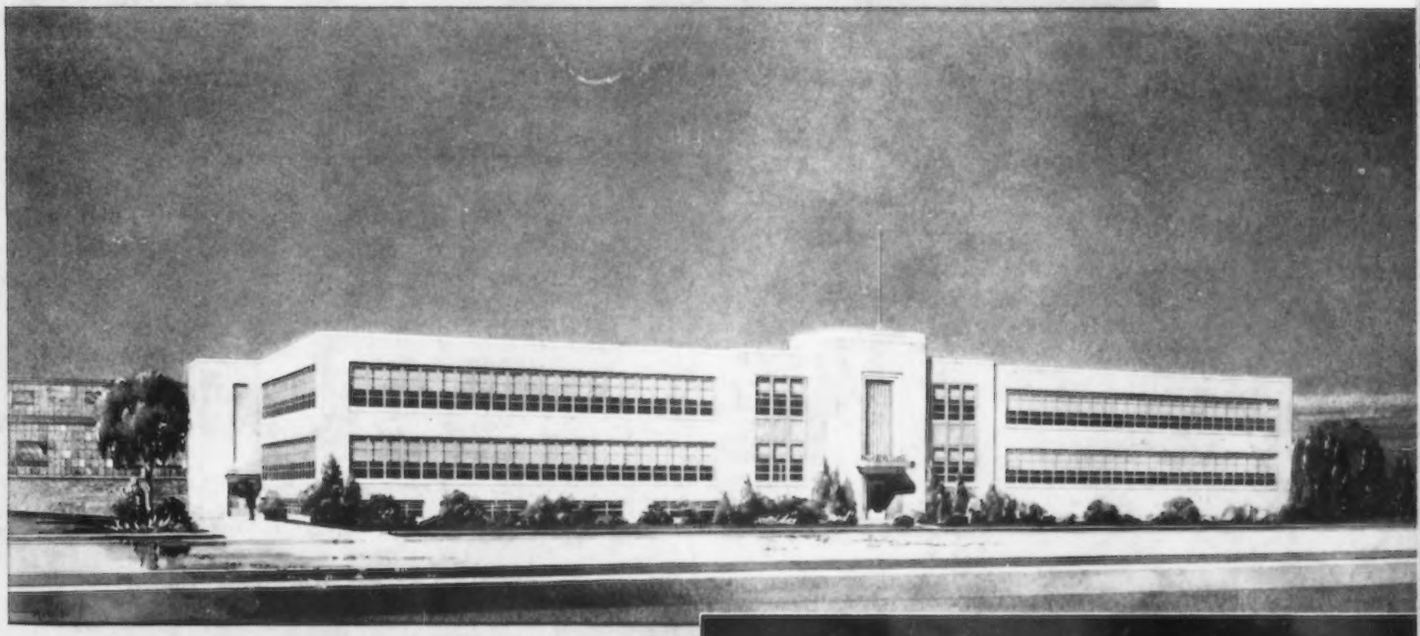
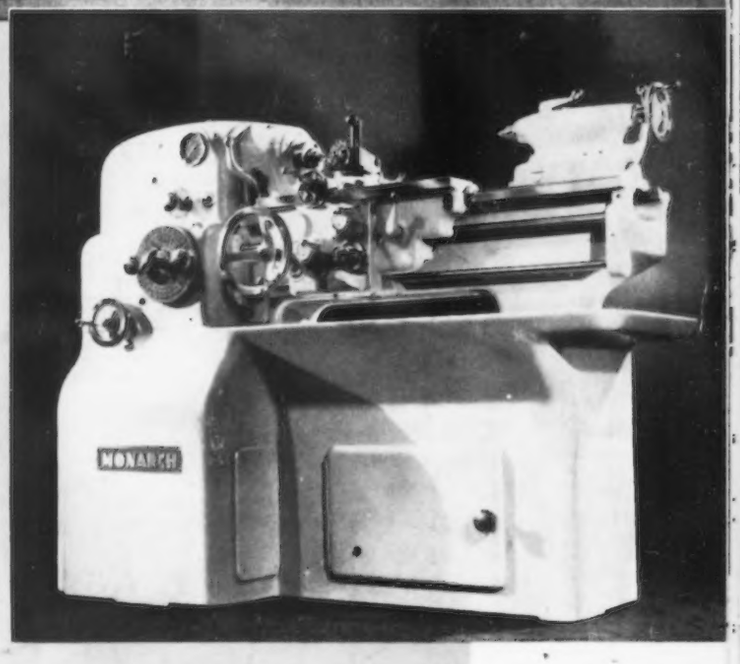


ONWARD MONARCH!



The achievement of a long cherished ideal is represented by the completion of Monarch's new office, engineering, and factory additions, which increase the available floor space 33⅓ per cent.

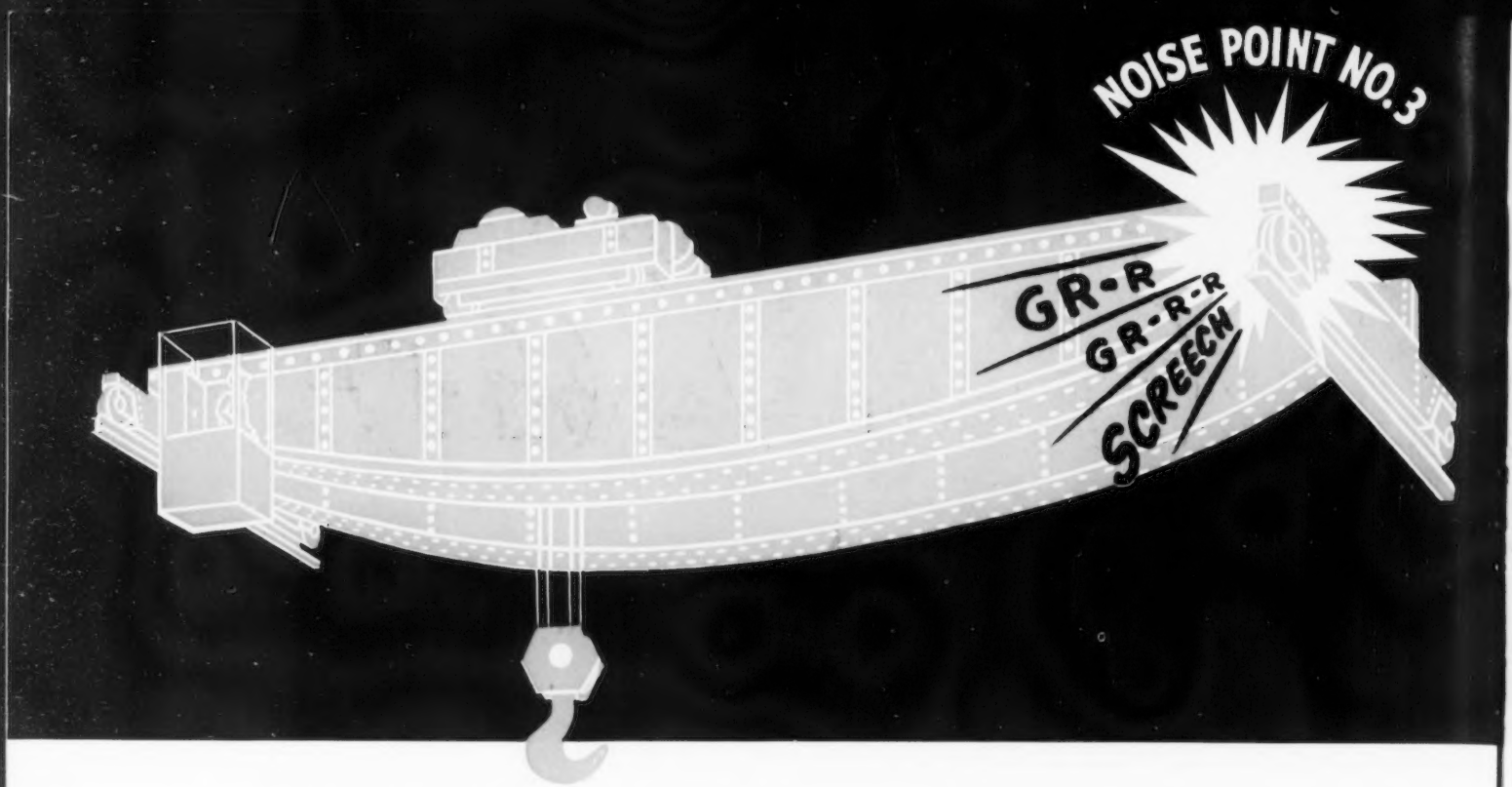
The unceasing effort which has identified Monarch's progress for so many years and which has resulted in a constant advancement of the industrial frontier, is reflected in the design, layout and purpose of this modern structure.

For thirty years Monarch has endeavored to broaden the scope of lathe usefulness . . . to make them do more jobs in a better fashion . . . to make them earn more profit for their users.

The Monarch Lathe, shown here, typifies Monarch's accomplishments. See Monarch's lathe exhibit at the Machine Tool Show.

YOUR SMARTEST INVESTMENT TODAY... BETTER MACHINE TOOLS MAKE MORE MONEY WITH MONARCHS!

THE MONARCH MACHINE TOOL CO. • SIDNEY, OHIO, U. S. A.



This NOISE in your bridge wheels means WEAR!

Every "screech" of your crane wheels is a positive warning of wear. It is a signal that, sooner or later, expensive crane maintenance will be needed in your plant.

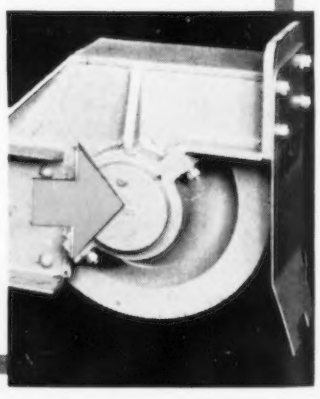
Whiting cranes are noted for their quiet operation. Smooth-running herringbone gears have replaced noisy spur gears. Anti-friction roller bearings keep gears in perfect alignment for years. Drive units run in dust-tight oil baths to prevent wear.

Listen to other cranes—then listen to the quiet operation of a Whiting. You will then realize why Whiting cranes give so much extra service. Whiting Corporation, 15601 Lathrop Ave., Harvey, Illinois.

CAPACITIES 1 TO 400 TONS

Rotating-Axle Bearings in Whiting Cranes reduce Noise and Wear in the Bridge Wheels

At Noise Point No. 3—the bridge wheels—Whiting cranes are equipped with heavy-duty precision roller bearings supporting rotating type axles. The bearing pads are machined *after* the truck frame is welded. This construction, together with tapered tread drive wheels, keeps the bridge wheels in perfect alignment. They always run true and free—and cannot bind and thus cause noise and wear.



HOW TO WRITE a Traveling Crane Specification

Contains a discussion of the important factors in crane design and complete information on how to specify an overhead traveling crane to fit your individual needs. Will be sent to all production executives on request.

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you reduce weight without increasing costs

LOW-ALLOY Mayari R is the outstanding steel in its class. It is a modern steel that broadens the scope of the designer and works with increased economy for the user.

It lightens the weight of structures and increases the pay load.

It resists atmospheric corrosion and lengthens the life of structures and products.

It reduces maintenance and distributes investment over longer periods.

Fully Pre-proved

During a long and comprehensive investigation and development program Mayari R was subjected to tests that covered fabrication, working, machining, welding, corrosion, abrasion and other features. It was used in routine shop practice by regular workmen in building freight, passenger and mine cars, ships, barges, tanks, towers, hoppers, roofs and other structures. It was thoroughly proved in commercial practice.

From the beginning of its development, regular production open-hearth heats of Mayari R were made and used. Recommendations as to its use are based on commercial steel-making practice. It is a practical, consistent steel.

- Workability and weldability of mild carbon steel
- Used "as received"—requires no heat treatment to develop its properties or in forming and welding
- Five to six times the corrosion resistance of mild carbon steel
- Uniform in properties
- Available in all the usual forms
- Finished-job cost near that of structural steel

Available in Usual Forms

Mayari R is available in all the usual shapes—sheets, strip, structural shapes, plates, bars and cold-formed sections. Designers can utilize these forms to secure unity in design with increased economy.

Catalog on Request

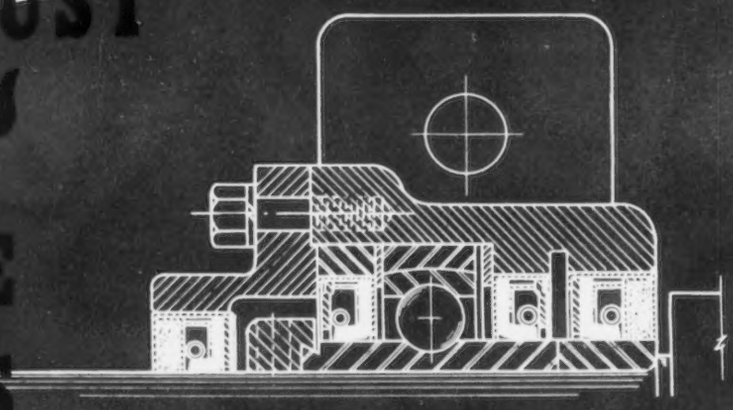
A catalog describing Mayari R will be sent on request. We will also be glad to confer with you to achieve the greatest usefulness with Mayari R.

BETHLEHEM STEEL COMPANY

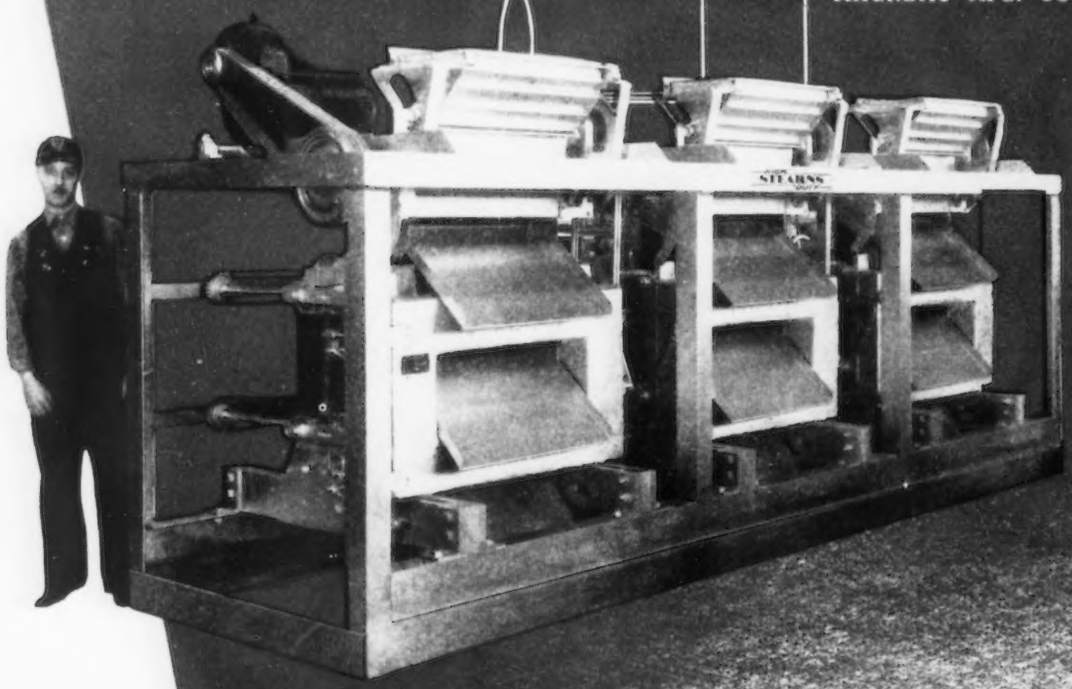
BETHLEHEM STEEL

THE IRON AGE, published every Thursday by the *CHILTON CO. (INC.)*. Publication office, Chestnut & 56th Sts., Philadelphia, Pa. Editorial and Executive Offices, 239 W. 39th St., New York, N. Y. Entered as second class matter November 8, 1932, at the Post Office at Philadelphia under Act of March 3, 1879. $6.00 a year in U. S., Canada $8.50, Foreign $12.00. Vol. 144, No. 2.

FELDSPAR DUST *harmless* TO THESE BEARINGS



"PERFECT" SEALS, CONVENTIONAL SINGLE TYPE, ALSO COMBINATION FELT AND LEATHER TYPE AS APPLIED TO STEARNS MAGNETIC MFG. CO. PILLOW BLOCK.



THE bearings of the Stearns Type K-90 3-field magnetic separator are all equipped with Chicago Rawhide "Perfect" Oil Seals to exclude the dust and grit which would inevitably be carried into the bearings by the machine's operation.

The installation pictured is one that has for a number of years handled Feldspar, a very hard and highly abrasive mineral. In all these years of service the bearings of this separator have needed neither maintenance nor replacement.

You can always rely on Chicago Rawhide "Perfect" Oil Seals to protect bearings under even the most critical operating conditions from attack by either dust or moisture. And the cost of installing such protection is negligible. These seals are small, compact, self-contained and easy to apply. Ask Chicago Rawhide engineers for their experience with sealing problems such as yours.

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PERFECT Oil Seal PATENTED

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The WEAPONS OF DEMOCRACY

A message to the men who operate machine tools

● The tools you operate are both the weapons and the badge of democracy and freedom.

You and I and everyone have to *earn* the right to existence. Only weaklings and thieves wail that "the world owes us a living."

Out of what you produce comes—first—your wage, then the taxes for the right to live in freedom, and then a small wage to the capital which buys and maintains the place in which you work. The more you produce and the better your product, the more you are worth to society and the more you will earn. That's the difference between *Democracy* (where everyone is judged on his own merits and everyone has the chance to rise to the top of the heap), and *Dictatorship* (where everyone is dragged down to the level of the poorest and everyone works for the state instead of for himself and his family).

In Democracy we believe in giving a workman better and better tools, so that he can produce more and better work—and so earn more, progress further, take greater pride in his own accomplishment. The entire history of America proves that better tools reduce prices, broaden markets, make possible more luxuries for more people, and so increase employment.

New Warner and Swasey turret lathes make you worth more because they help you produce more *with less effort,* and they help stabilize employment by reducing costs and so helping your employer hold markets in the face of rising taxes and material prices.

WARNER & SWASEY

Turret Lathes

Cleveland

For Profits
MACHINE TOOL SHOW
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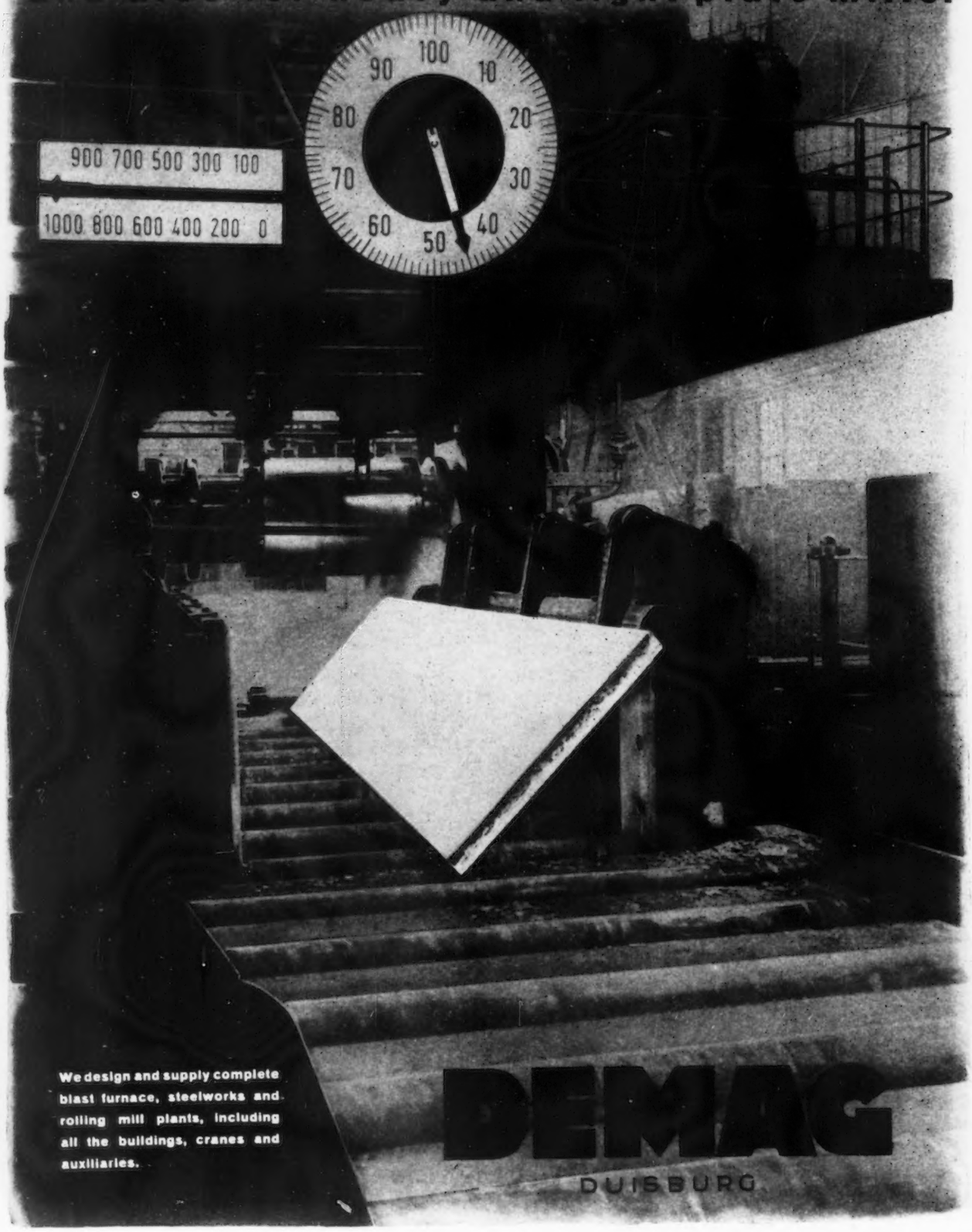
YOU CAN TURN IT BETTER, FASTER, FOR LESS . . . WITH A WARNER & SWASEY TURRET LATHE

SLABBING MILL

for producing breakdowns for wide strip mills and also for heavy and light plate mills.



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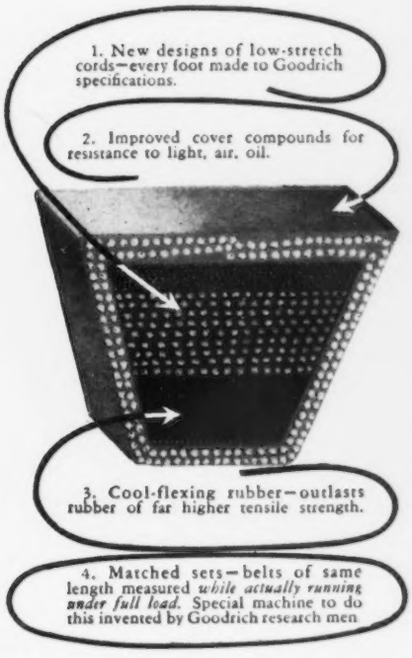
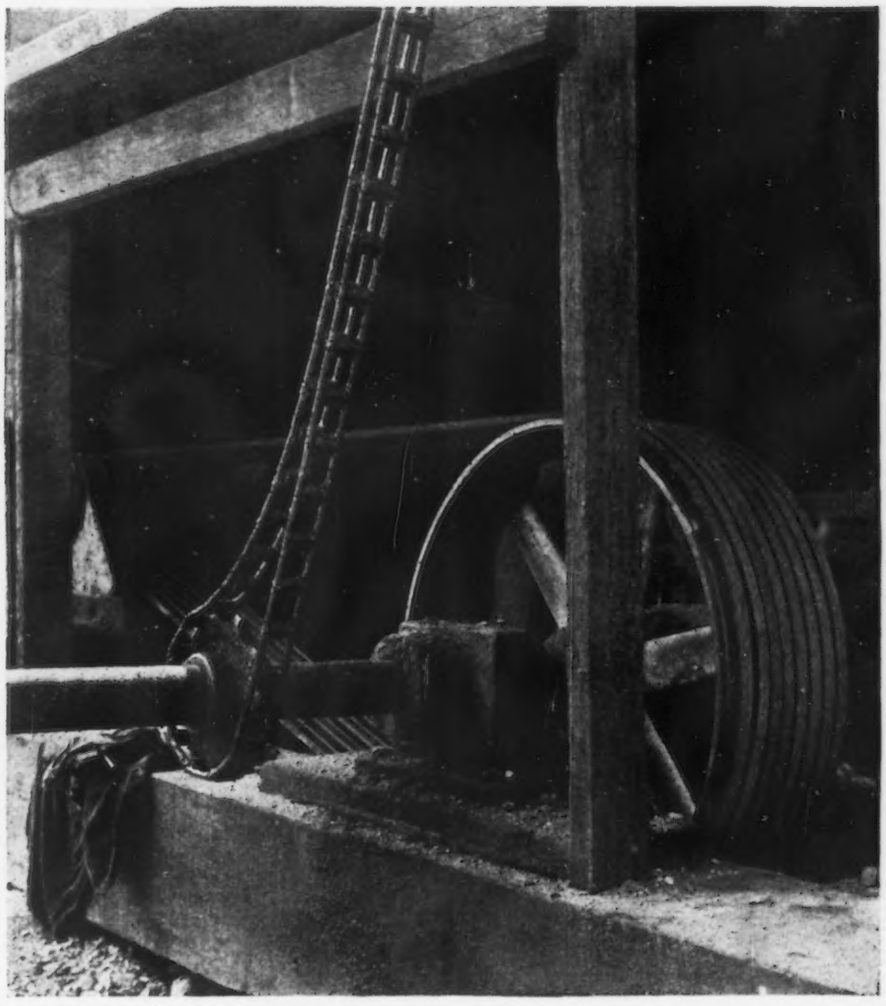
Pittsburgh, Pa.

Recent Improvements in Goodrich V-Belt


1. New designs of low-stretch cords—every foot made to Goodrich specifications.
2. Improved cover compounds for resistance to light, air, oil.
3. Cool-flexing rubber—outlasts rubber of far higher tensile strength.
4. Matched sets—belts of same length measured *while actually running under full load.* Special machine to do this invented by Goodrich research men



5 years in industrial "Dust Bowl"

prove time-and-money-saving values of Goodrich V-Belts

EVEN in the clouds of gritty, cutting dust under this quarry crusher, Goodrich V-Belts have stood up for five years of gruelling use—because of their special construction improvements which can save time and money for you, too.

Goodrich V-Belts are made with a tough cover of rubber-impregnated fabric which prevents ply separation by protecting the belt from dust, moisture, fumes, oil.

Goodrich V-Belts are available in *matched sets*—each belt tested and measured under *actual operating tension,* and a set then made up only of those belts which will operate together as a good team should. Belts in ordinary sets develop unequal lengths in use, the longer belts then idle and slip, and wear out too soon. In Goodrich matched sets each belt pulls its full share, and the set wears evenly, lasts far longer.

Goodrich Research Makes Other Improvements

In addition to protective covers and matched sets, Goodrich V-Belts have other improvements, developed by Goodrich research, which increase belt life, reduce belt cost and trouble. One important value is a special cool-running rubber which reduces internal belt heat by 75%. The heat of flexing is what destroys belts as it does tires. Just as tire life has been multiplied in recent years, Goodrich V-Belt life is now far longer than the life of belts you may have known even a few years ago.

Other developments of Goodrich research are low-stretch cords which reduce slippage, and Goodrich Age-Rite compound which resists oxidation or attack by air.

Goodrich Belts Available Quickly

When you can have the lower cost, the greater freedom from trouble and production shutdowns which Goodrich V-Belts assure you, why stick to belts which do not offer you these advantages? There are 60 distributing points for Goodrich V-Belts—one near you. Call your Goodrich Distributor—and start saving money, time and trouble. The B. F. Goodrich Company, Mechanical Rubber Goods Division, Akron, Ohio.

Other typical Performance Reports of Goodrich V-Belts

▼

On dredge in cement-products plant, Goodrich V-Belts are still in use after 8 years.

▼

Steam turbine drive had ruined former belts in less than a month. Goodrich V-Belts have lasted 14 months and are still good.

▼

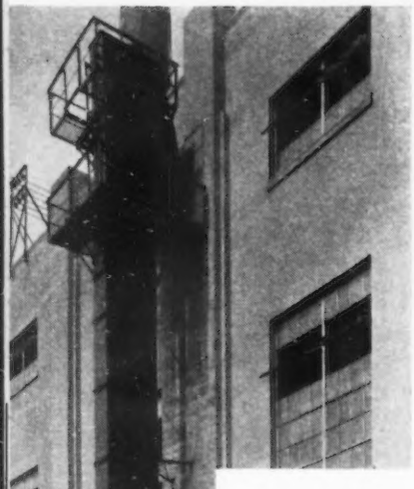
The terrific shock load in a "pole peeler" broke belt after belt instantly. Goodrich V-Belts were tried and are still in operation—the buyer now will use no other brand.

Goodrich

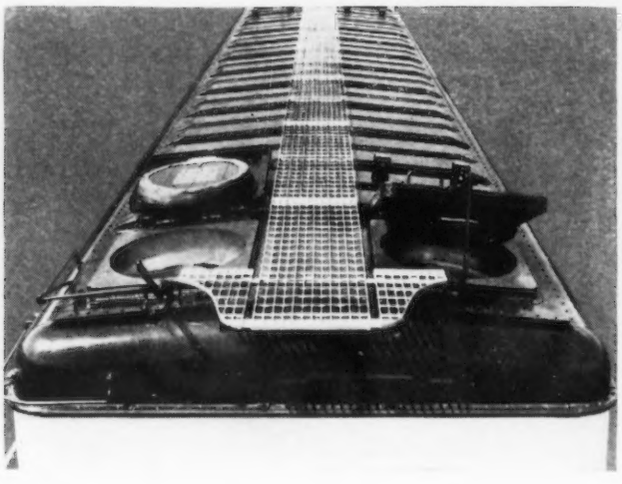
cool-running, tension-matched

V-Belts

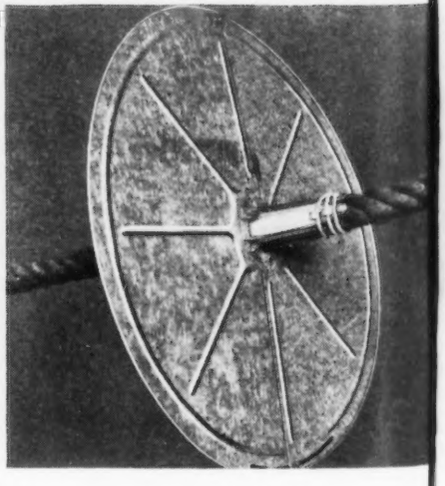
WE TAKE OUR OWN ADVICE. Almost everything you see in this picture of our new Irvin Works is made from U·S·S Copper Steel — water tanks, penthouse, roofing, siding, ventilators. Superior resistance to corrosive industrial atmosphere led to this choice.



VERTICAL BUCKET COAL ELEVATOR built with casing of U·S·S Copper Steel. Coal handling equipment of all kinds is exposed to corrosive conditions and needs the extra rust-resistance offered by U·S·S Copper Steel. Other uses are tanks, sheds, tipple roofing and siding.



A NEW AND INTERESTING USE of U·S·S Copper Steel is this galvanized running board and brake step for freight cars. Railroads quickly recognized the value of copper steel's low cost and high resistance to atmospheric corrosion and are now using it for roofing, siding, tie plates, etc.



U·S·S COPPER STEEL fights rats and salt air corrosion in this galvanized rat guard. For marine applications where atmospheric corrosion is always a serious problem, U·S·S Copper Steel assures longer life for your products and freedom from costly maintenance.

UNITED S

FOR A DOLLAR PRODUCT OR A MILLION DOLLAR PLANT—

U·S·S Copper Steel

gives 100 to 200% greater resistance to corrosion

COPPER STEEL reverses the order of things—instead of investing a dollar to earn a nickel, you invest a nickel and earn a dollar. By building products and structures like these with U·S·S Copper Steel, you can increase their life 100% to 200% at an extra cost of less than 5%.

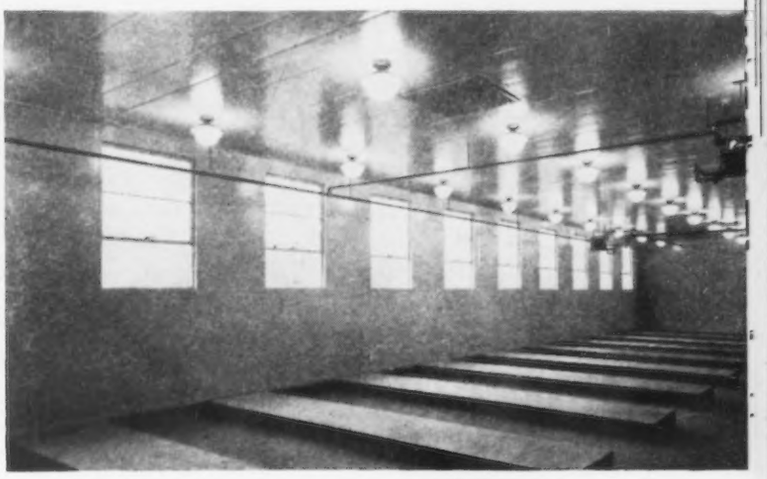
These figures have been verified by the American Society for Testing Materials through 21 years of exhaustive tests on the various types of iron and steel. U·S·S Copper Steel has two to three times the atmospheric corrosion resistance of plain steel. For products or equipment that are continually exposed to weather or moisture, it is one of the cheapest forms of "Life Insurance" available. Hundreds of products now made of plain steel or iron would last longer, give better service if made of U·S·S Copper Steel.

If you are building a product, plant or structure that must withstand the ravages of weather, find out how little it costs for the extra value of Copper Steel.

U·S·S Copper Steel has all the easy fabricating qualities of plain steel. It can be obtained in black or galvanized sheets in standard sizes and finishes. Write now, for the complete story of U·S·S Copper Steel and where it is being used. Address any of the companies below.

FACTORY WASH ROOM with walls and ceiling of U·S·S Copper Steel. For any installations where steel must withstand moisture, U·S·S Copper Steel is the economical choice for lasting service.

Here's the Proof!
HERE'S THE PROOF!
UNCOATED COPPER STEEL
91% SOUND AFTER 21 YRS.
COPPER STEEL 91% SOUND
OPEN HEARTH COPPER IRON
NON-COPPER STEEL 11% SOUND
OPEN HEARTH NON-COPPER IRON
This chart compiled from inspection reports of the Committee on Corrosion of Iron and Steel, A.S.T.M. Proceedings 1937, shows results of tests carried on at Annapolis, Md. from 1916 to 1936. After 21 years' exposure, 91% of COPPER STEEL sheets remained "sound" (unperforated). Other materials were decidedly inferior.



CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY, *San Francisco*
TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*

Scully Steel Products Company, Chicago, *Warehouse Distributors*
United States Steel Products Company, New York, *Export Distributors*

USS

STATES STEEL

WE Can't Stand By and See the Machine Slandered

Sensing a real threat to industrial progress in the present day recurrence of the age-old antagonism to mechanical improvement, The Iron Age has taken prompt and aggressive steps to defend the machine —the object of direct attack.

The first of a series of graphic editorial presentations appeared in the May 18 issue and under the title of "the Threat to the Machine" outlined the nature of the anti-machine propaganda which is being presented to millions of people from coast to coast.

The second, "HE'S BACK IN 1899 and doesn't know it!" appeared June 8. It begins the presentation of conclusive proof that the machine is actually a builder of employment and of mass consuming power. The third presentation is on following pages. (Others will appear August 10, September 14 and September 28.)

The Iron Age undertook this job because it saw that this "threat" could easily become not merely a sales deterrent but a serious obstacle to industrial progress.

This campaign is typical of the constructive work that The Iron Age does for its industry in addition to regularly providing authentic news and technical information. Small wonder that it leads in reader interest, influence and advertising effectiveness.

If you are a manufacturer of machinery and would like the full story of what this series is accomplishing, write—

THE IRON AGE, *239 West 39th St., N. Y.*

A Chilton Publication

THIS is the third of six graphic presentations dealing with the improved machine as a builder of employment and of mass purchasing power.

The first appeared in THE IRON AGE of May 18 and the second in the issue of June 8, 1939.

In this installment we see the record of the machine in six widely different American industries.

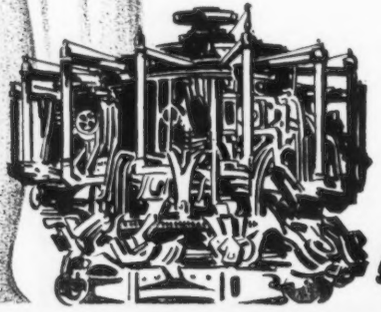
The Glass Container Industry

IS your business primarily concerned with glass containers? Milk bottles, pop bottles, beer bottles, pickle bottles, etc.? If so, you owe your present job undoubtedly to the glass bottle-making machine.

The automatic bottle machine created the milk bottle and this in turn created our modern milk distribution system with 66,000 milkmen and 73,000 service employees. The soft as well as the hard drink industry is a "bottled" business. And a large part of the 130,000 wage earners in the canning and preserving industries owe their jobs to the automatic glass container machine.

Employment (as of 1935) due to machine made glass containers:	
In the making of containers	24,000
Making glass container machinery	600
Milkmen	66,000
Milk station and servicing	73,000
Glass sand mining	1,000
Employment in packing and preserving due to glass containers	13,382
Employment in spirituous and soft drink making due to glass containers	30,000
Employment in merchandising above two items	15,433
	223,415

Yes, the bottle-making machine gradually eliminated the 28,000 glass blowers who had a habit of dying young in this lung bursting business. But on the other hand, the machine making of containers has created profitable and healthful employment for over 200,000 men and women.



. . . Before the glass bottle machine was invented there were 28,000 people engaged in making glass containers.

. . . Now there are 24,000 directly engaged in making glass containers but supplementary employment created raises the total to over 220,000.

Typewriters and Office Machines

WOMEN were almost unknown in the business world in 1868, when the typewriter was invented. This invention set women up in business, so to speak, and in increasing numbers. In 1930, there were 775,000 women stenographers and typists in the United States—about 37 times as many as there were even in 1890.

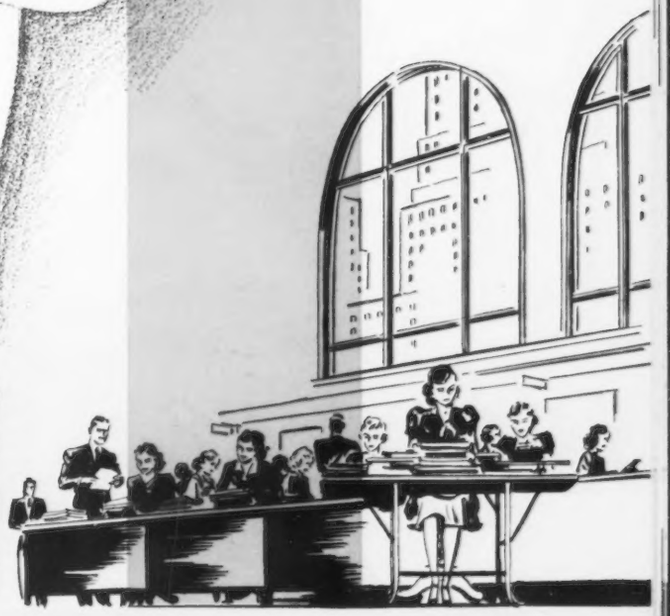
More typewriters year after year have seemed to call for more women in business, year after year, and more women have, by the same token, called for more typewriters. An upward spiral. In 1919, there were 15,669 wage earners employed in making typewriters and supplies and in 1935 there were 33,866 wage earners thus occupied.

Adding and calculating machines and cash registers have more or less "evoluted" from the first business machine, the typewriter. Over 20,000 wage earners are employed in making them.

Altogether, business machines have created well over a million jobs in the United States.

Some anti-machine apostle might suggest doing away with them and going back to the quill pen and the letter press so that more people could be employed. Certainly it would require at least three or four times as many people to do the work. The trouble with this bright idea, like that of doing away with steam shovels and excavating roads and ditches with teaspoons, is that the work just wouldn't be done!

. . . Back in the horse and buggy days of 1890, there were not more than 20,000 women typists and stenographers in the United States.

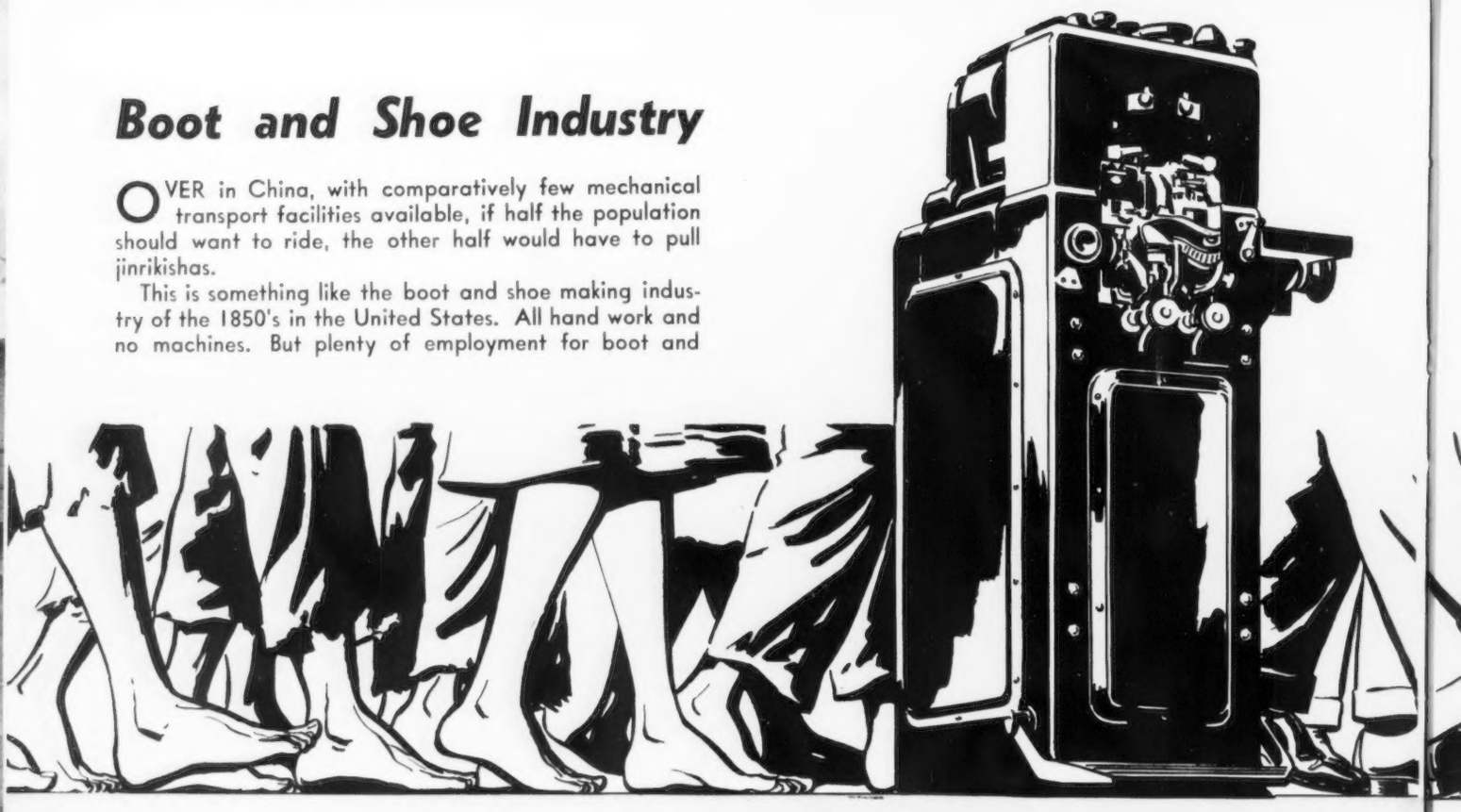


. . . Since the typewriter has "set women up in business," the number employed has increased to 775,000.

Boot and Shoe Industry

OVER in China, with comparatively few mechanical transport facilities available, if half the population should want to ride, the other half would have to pull jinrikishas.

This is something like the boot and shoe making industry of the 1850's in the United States. All hand work and no machines. But plenty of employment for boot and

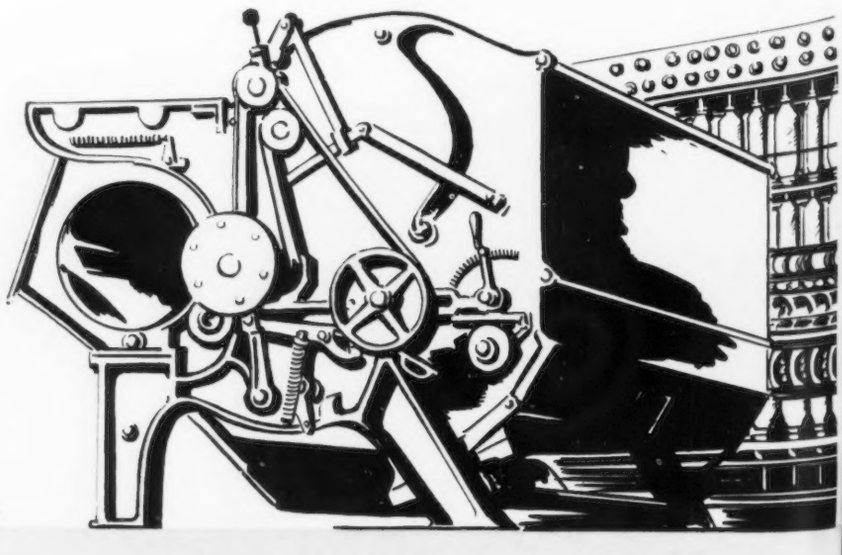


. . . Tramp—tramp—tramp. The boys—and girls—are marching. Marching through time and through invention, improvement and improved machinery to better living conditions and greater

Cotton Textiles

BACK in 1790 cotton goods was a luxury. Negroes had the tedious job of combing out the seeds by hand. Consumption that year was only 1.4 lb. per capita.

Then, in quick succession came two important inventions. Slater's spinning machine and Whitney's cotton gin. Either of them could produce more output in a given time than could many men or women workers. Undoubtedly, the first application of these machines caused some labor displacement. The kind of people who were combing and spinning by hand methods were probably not capable of understanding machine operation. But it was not long before they had a chance to go back to work. For these machines revolutionized the South, turning it



. . . Drop a pebble of thought or an idea in the still waters of economic relations and the circles spread out in endless succession. So with invention. Its effect spreads from the

shoemakers, even though half the population had to go barefoot.

In those days, there were 5644 shoemakers for each 1,000,000 of our population. Today, there are but 2482 for each million. On the face of it, a plain case of technological displacement.

Even with the added employment of the hide and leather industry due to millions of more shoes, and the added employment of wholesale and retail outlets, it is doubtful if the boot and shoe industry generates as much employment in its present mechanized state—per million of population—as it did in 1850.

Mechanization, in the shoe industry may not have increased employment. But it has given our population shoes to wear. They did not have them in 1850.

The modern boot and shoe industry is based upon the McKay stitcher, invented before the Civil War. This stitches the upper to the sole. Possession of this mechanism by the North enabled our Union soldiers to be well shod and this materially helped the North to win the war.

You cannot always judge an invention by the amount of employment it destroys or creates. Availability of products to millions may be worth more than jobs to thousands.

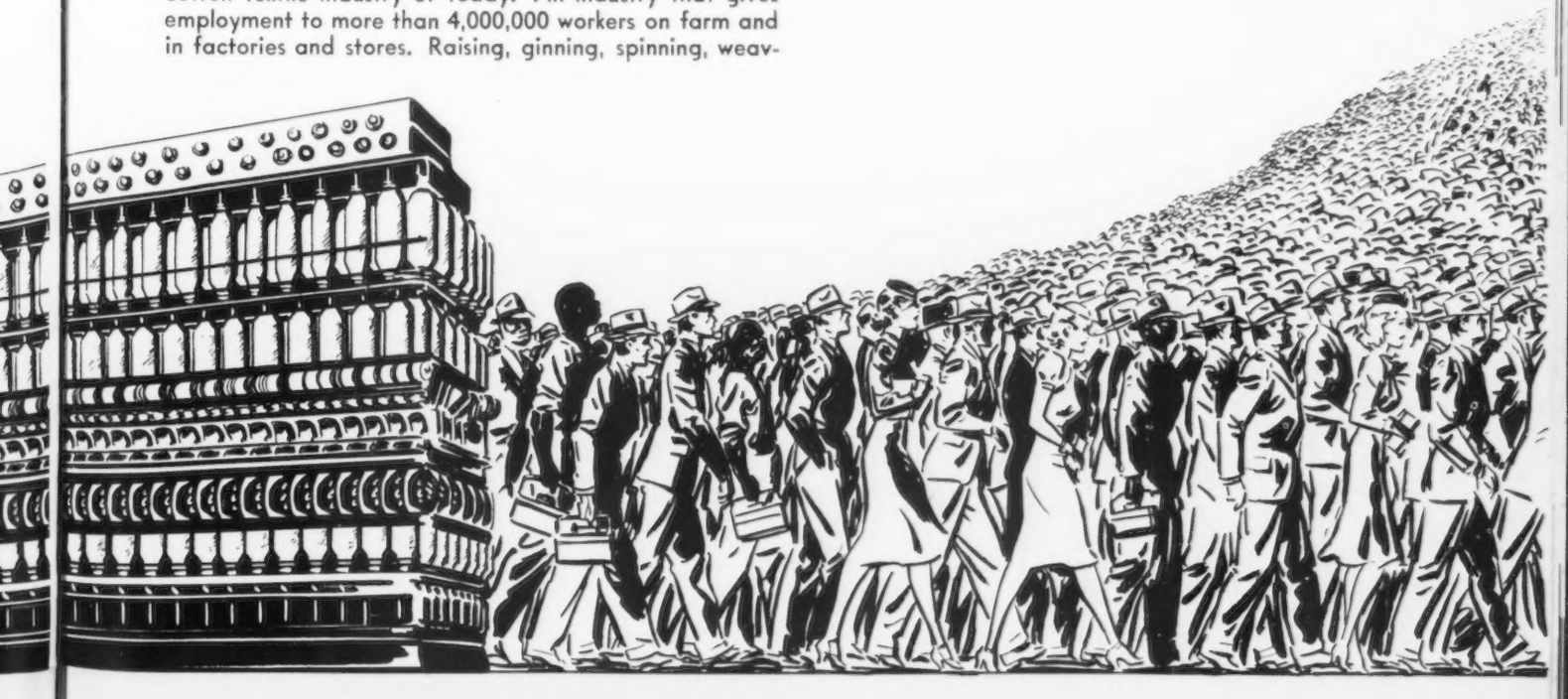
comfort. Nowhere is this better illustrated than in the boot and shoe industry which gives us the fine footwear that we now take for granted but which our forefathers could not have.

into a huge cotton plantation and made America the World's chief source of cotton — until the New Deal handed this position over to Argentina and Australia.

The employment generated by these inventions has been so great as to be almost impossible to measure. The cotton gin and the spinning machine created the huge cotton textile industry of today. An industry that gives employment to more than 4,000,000 workers on farm and in factories and stores. Raising, ginning, spinning, weaving, manufacturing cotton goods and garments to the tune of 23 lb. per capita today.

Even the modern laundry business, with its 208,000 employees, owes most of its progress to "King Cotton."

All of these jobs were created by "time-saving" machinery.



immediate circle of application until it may cover the world. Think of what the cotton gin did to build up employment for four million Americans in these concentric circles.

Printing and Publishing

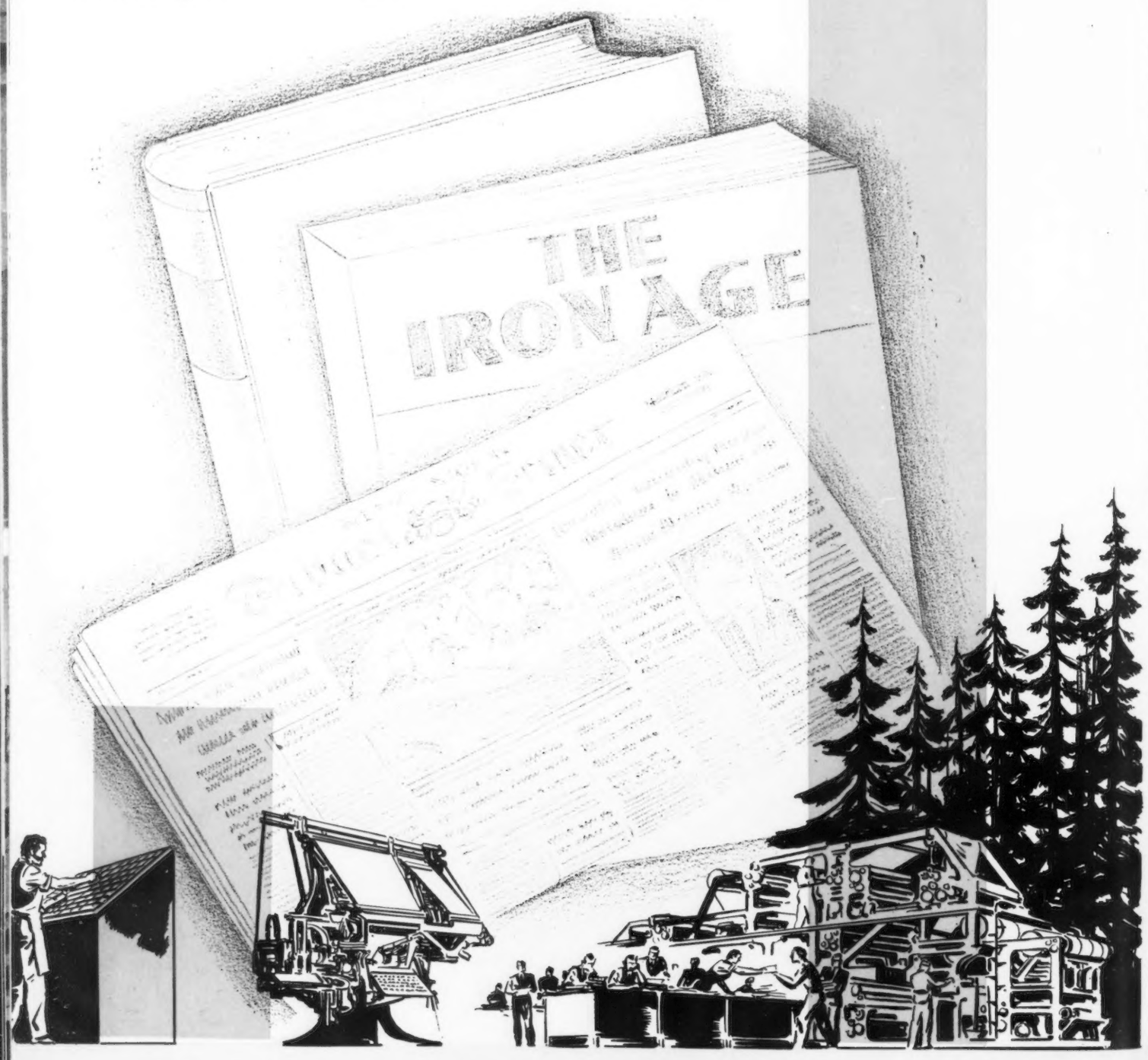
IF your business is connected with making or merchandising the printed word, then nine chances out of ten you owe your job to the invention of the linotype machine. It was criticised and opposed at first, as a labor destroyer, since it multiplied output from five to ten times.

Strangely enough, machines that multiply output or "save labor," multiply jobs too. And the linotype certainly did. If we had to set type by hand there would not be many newspapers, and books would be a luxury.

In 1880, before the linotype, we had 1726 printers and compositors in the U. S. per million of population. Now we have 2500 plus, per million of population. The output is at least fivefold greater, with corresponding increase in employment in the business depending on printed matter.

Following are the latest available figures on measurable employment due to technological advances in printing:

In book and job printing	143,000	Newsdealers	19,000
In newspaper and periodical printing	126,000	Employees in book stores	15,000
In bookbinding, etc.	20,000	Wage earners in paper and pulp making	138,000
In engraving	7,000	In paper wholesaling	27,000
In stereotyping	4,000	In book, periodical and newspaper wholesaling	9,000
In making printing equipment	10,000		
Authors	12,000		
Editors and reporters	52,000		582,000



. . . The linotype was indeed a labor displacing machine. It multiplied output from five to ten times. What then, would happen to the printers and compositors?

. . . Well, what *has* happened to them? The 61,000 employed in the printing and publishing industry of 1880 has grown to 268,000, largely because of labor saving machinery.

Automobile Industry

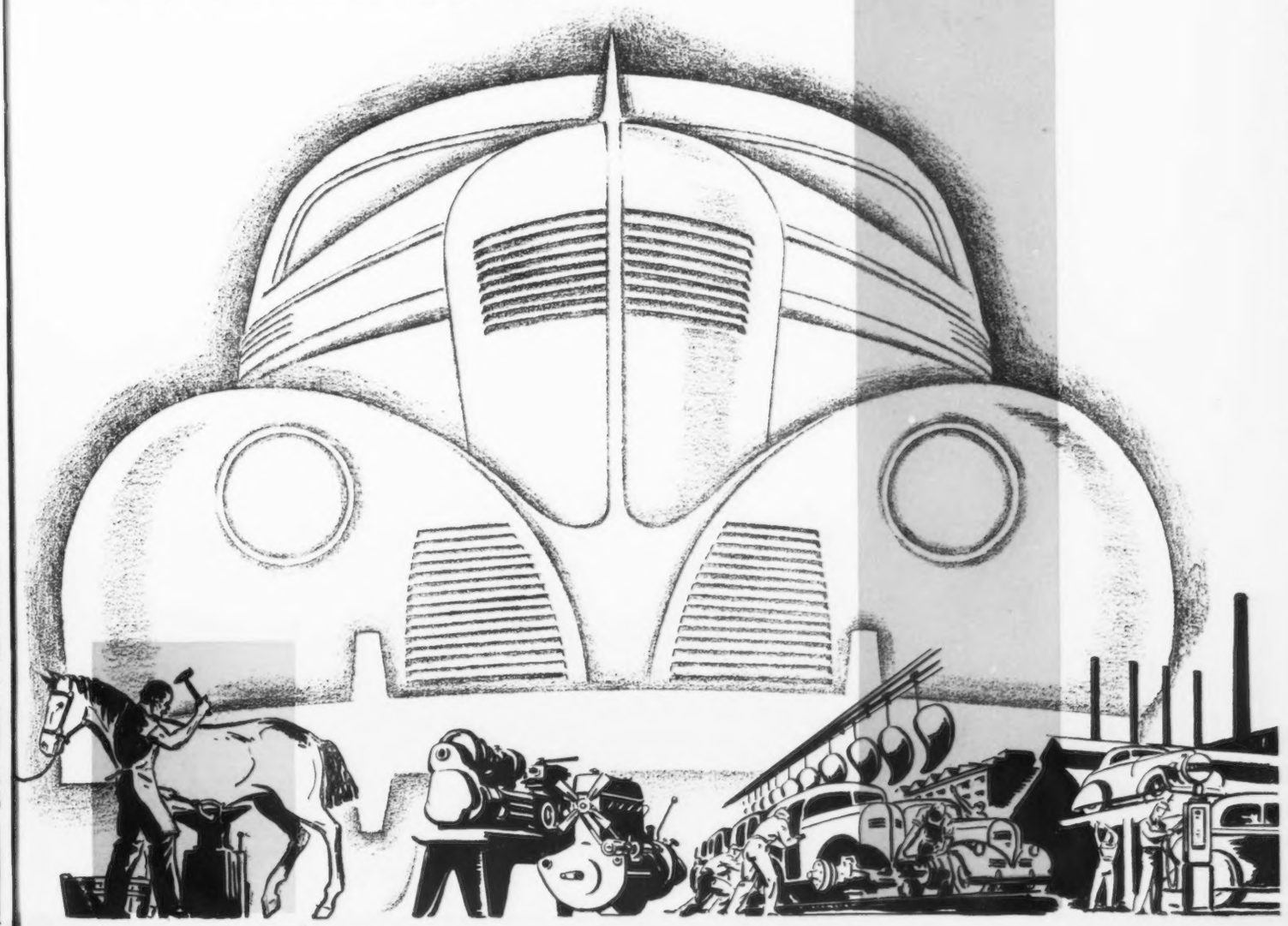
THE buggy whip business is not what it used to be. Blame the automobile for that. The automobile and the hundreds of time saving machines and devices that are used in making it have put it in reach of the average man's pocketbook.

Back in 1890, at the birth of the automobile, there were about 177,000 teamsters, draymen, coachmen and hackmen mounted at the rear end of horses. Now there are only about 150,000 of them. But that is not all of it. There were some 39,000 harness makers in 1900; now, there are but 7500 of them. There were 30,000 coach and wagon makers in 1900. Now, there are only 4000. Blacksmiths have shrunk during this time from 215,000 to 121,000. Wheelwrights from 13,000 to none.

That means, as nearly as we can figure it, that the automobile has abolished some 150,000 jobs, since 1900.

On the other hand, it has created during that time some six million new jobs, according to the calculations of the Automobile Manufacturer's Association. For remember, in addition to the half million motorcar makers and the three million truck drivers and chauffeurs and the labor in repair shops, garages, filling stations, traffic signal shops, accessory shops, etc., the automobile has generated 90 per cent of the employment in the gasoline industry, 80 per cent in the rubber industry, 73 per cent in the plate glass, 60 per cent in the alloy steel industry and so on down the line.

Who says machines do not manufacture employment?



. . . Before the automobile, there were about one million people who earned their living because of some form of highway transportation, excluding of course the traction companies.

. . . Now it is reliably estimated that fully six million people have employment that is directly caused by the automobile. Not in the making of them so much as in their use.

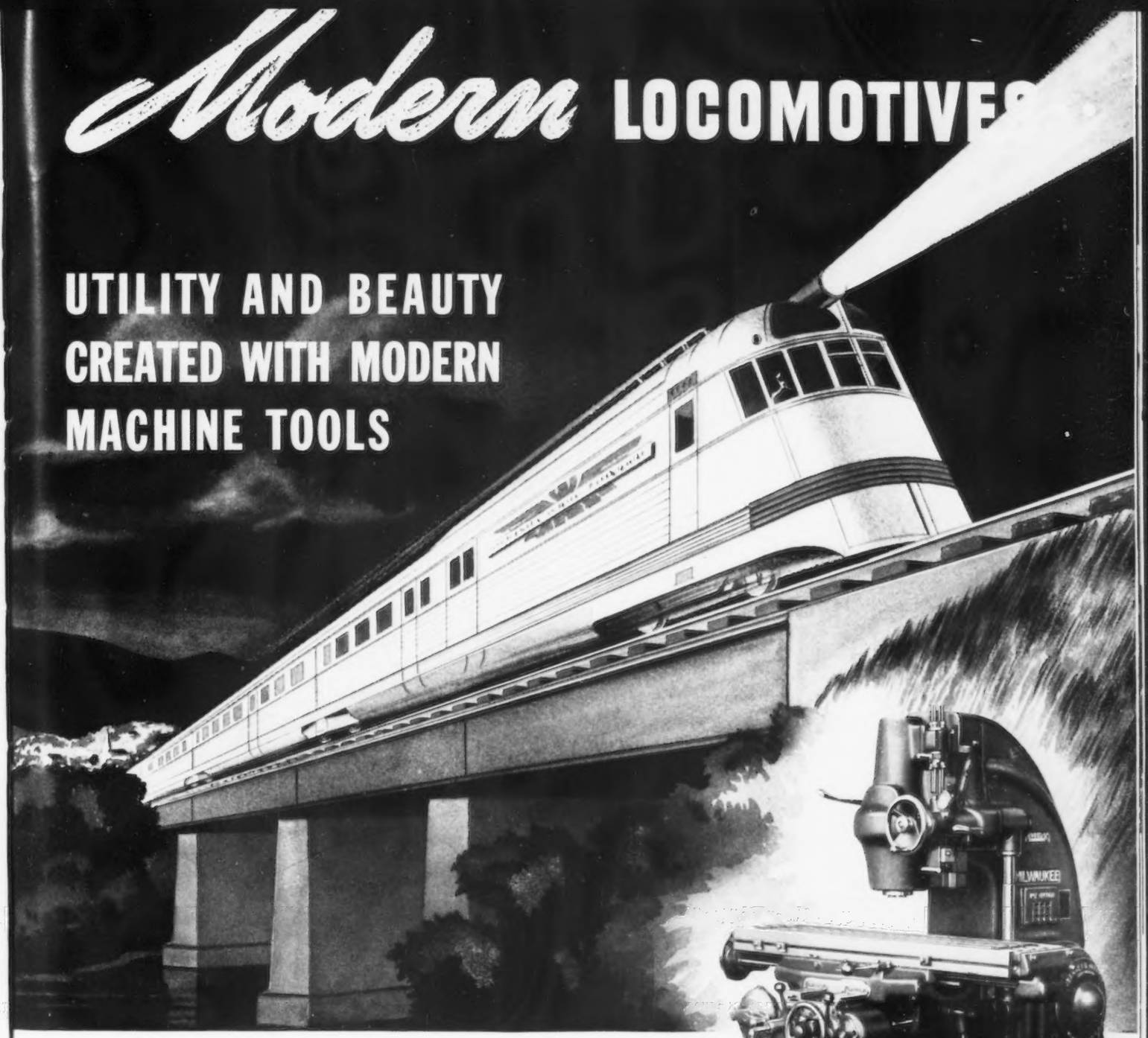
Who Invented Your Job?

FOLLOWING are a few of the jobs created by invention and improvement during the latter part of our machine age. All of them are due to basic time saving inventions made available through the operation of time saving machinery. It would require six or seven more pages like this one to cover the full range of the present-day jobs which have been created by invention during the last three generations.

makers of loaders and pushers for by-product coke ovens—steam turbine motors makers—zinc oxide workers for rubber tire production—makers of nitric acid for rayon manufacture—calcium carbide production clerical staff—printing company salesmen taking orders for linotype printing—clerical and office forces in plants building by-product coke apparatus—finishers of rayon fabrics—instructors in diesel motor schools—electric tool steel metallurgists—radio engineers—workers in automobile insurance companies—makers of oxygen apparatus for airplane—radio repairmen—gas engine designers—electric welding apparatus repair men—makers of tubes for radios—plastic parts makers in cash register manufacture—acetylene torch makers—halftone production clerical force—repair and maintenance men in stainless mills—makers of boilers for steam turbine use—tool and die makers on jigs and fixtures for electric welding operations—makers of coil springs for automobiles—foundrymen in diesel motor plants—skilled and unskilled labor in aluminum rolling mills—packers and shippers of electric welding apparatus—makers of concrete mixers for road building—telephone supervisors—X-Ray tube makers—draftsmen for books, newspapers and magazines using halftone process—tire hand pump makers for use on pneumatic tires—workers producing dyes for plastic coloring—welders in refrigerator box plants—rubber brokers for pneumatic tires—calcium carbide chemist—advertising writers for merchandising phonograph records—supervisory staff in acetylene production—metallurgists in electric furnace operations—supervisors and other executives in electric furnace operation—cash register draftsmen—testers of finished rayon—composers, singers, conductors, actors, script writers and program makers for radio broadcasting—makers of fabric weaving apparatus for rubber tire threads—assembly line workers in automotive plants—raw material suppliers for phonograph record manufacture—test engineers and inspectors in diesel motor making plants—test pilots—molders in plants making gas engines—editorial workers producing text material for setting by linotype—seamless tube salesmen—electric tool steel melters and helpers—salesmen of coke by-products—makers of anti-freeze solutions for automobiles—electrotype makers—steam turbine central station maintenance workers—automatic refrigerator box makers—craftsmen engaged in glueing, veneering and decorating radio cabinets—jig and fixture makers in airplane plants—cash register repairmen—supervisory force in aluminum kitchen utensil factories—copywriters preparing advertisements for selling automobiles—salesmen of plastic molding equipment—makers of gages and instruments for electric welders and welding—packers and shippers in plastic product plants—makers of equipment for locating lost radium—die makers for radio parts manufacture—operators applying paint, rust inhibiting compounds to airplanes—raw material suppliers for making radio parts—phonograph repairmen—musicians engaged in making phonograph records—mechanics and laborers in electric welding apparatus manufacture—packers of radios—"hot dog" station attendants or proprietors—acetylene laboratory and research technicians and assistants—forgers making automotive forgings—halftone process wood workers—salesmen of by-product coke apparatus—workers on seamless tube heating furnaces—skilled and unskilled labor in aluminum forging plants—engineers in radium extracting plants—valve makers for steam turbine use—gas engine engineers—phonograph record sales clerks—phonograph pick-up arm makers—mechanics and helpers in diesel motor plants—stainless steel melters and helpers—radio retail store proprietors and managers—testers of automobile engines—airplane fabric producers and furniture makers—rubber plantation supervisory force—packers and shippers of tires and inner tubes—halftone production supervisory force—calcium carbide-acetylene calcium carbide handlers in acetylene production—X-Ray related appliance makers—acetylene lamp metalworkers—workers producing formalin for synthetic resins—ground crews for radio service—telephone switchboard makers—press operators making refrigerator shells—advertising and publicity in sale of cash registers—makers of safety glass for automobiles—radio dial makers—makers of buffing wheels for polishing automobile parts—makers of iron forms for road building use—makers of linotype metal—electric welding apparatus salesmen—makers of cabin lighting system for airplanes—press operators for making records from master phonograph records—sound engineers in phonograph record making—plating operators for plating automotive parts—draftsmen in diesel motor plants—X-Ray diagnosticians — calcium carbide-acetylene lime quarrymen for carbide production—makers of head lamps for automobiles—phonograph turntable felt cutters and pasters—makers of electrotype copper melting furnaces, presses and other apparatus for electrotypes—tire retreading machine makers—makers of lighting equipment for halftone process—compressed acetylene salesmen—X-Ray technicians—acetylene makers of flexible metal hose for welding apparatus—workers producing mineral fillers for plastic production—X-Ray apparatus makers—telephone wire makers—refrigerating equipment salesmen—band saw machine makers—designers of diesel motors—die casting machine operators for making automobile door handles and other parts—clerical and office forces in stainless steel plants and offices—advertising staff in radio manufacturing plants—makers of gas pumps for dispensing gasoline—conductors in phonograph record making—printing ink workers preparing ink for use printing material set by linotype—maintenance and repair men in electric furnace operation—electric welding operators—workers on seamless tube mills—mechanics and helpers in plants building aluminum stream-lined trains—workers in radium paint factories—makers of firing apparatus for steam turbine central station use—gas engine installation men—makers of motors for phonographs—makers of coke conveyors for by-product coke plants—singers employed in phonograph record making—workers producing asbestos cloth, canvas and other material for synthetic resin impregnation—X-Ray photographic plate makers—halftone photographic apparatus makers—artists for books, newspapers and magazines using halftone process—workers in cutlery plants making stainless utensils—press operator making cash register parts—examiners for Government certification of pilots—workers making catophote devices for road markers—spinners in rayon textile plants—repair men on diesel motors—phonograph cabinet makers—makers of apparatus for manufacturing liquid air—workers in plants applying radium paints—rubber handlers and shippers for making pneumatic tires—laborers in cash register plants—heat treaters in automobile plants—sales engineers for electric furnace apparatus—makers of gages for automotive use—telephone and appliance makers—aluminum wire drawers and helpers—airline pilots—refrigerant chemical producers—machinists in plants making liquid air equipment—superintendents in plants making gas engines—electric welding helpers—state inspectors of automobiles—makers of fuel tanks for diesel motors—makers of aluminum bauxige roasting and reducing apparatus—workers in plants making plastic molding equipment—research staff in airplane manufacture—repair men and maintenance men in plastic product plants—operators testing parts for strength and size in airplane plants—calcium carbide production supervisory staff—ice box insulation material producers—workers in bauxite roasting and reducing plants—cash register tape suppliers—salesmen of electric furnace metal and chemical products—die makers for rayon thread manufacture—rubber salesmen for making pneumatic tires—sulphur mine operators for rubber tire production—halftone process manufacturers of copper plates—designers of plastic molding presses and equipment—workers engaged in plants molding plastic products—acetylene cylinder testers and inspectors—band saw machinists, tool and die makers—ice machine repair men—telephone insulator makers—designers of X-Ray equipment—workers producing glycerol for plastic production—acetylene makers of welding rods for acetylene welding—X-Ray appliance salesmen—acetylene cylinder repair men—makers of exhaust apparatus used in halftone process—makers of pressure gages for pneumatic tires—acetylene flame cutters—chemical and physical testing employees in airplane plants—radio aerial installers—clerical and office workers in plants making diesel engines—gas engine builders—supervisory and executive force in aluminum production operations—linotype operators—workers in plants building by-product coke apparatus—workers engaged in transporting by-product coke—workers in automobile finance companies—radio station time salesmen—electric tool steel metallurgists—workers in establishments making diesel motor operated trains—printers of rayon fabric—phonograph speaker designers—machinists in gas engine plants—makers of steam turbine central station circuit breakers—makers of equipment for transporting radium—salesmen of aluminum kitchen ware—supervising executives in seamless tube plants—electrical coil winders in welding machine shops—clerical and office workers in electric furnace building plants—printing press operators printing material set by linotype—actors employed in making phonograph records—printers of automobile road maps—workers producing asbestos for automobile brake lining—designers of plastic parts for radios—press operators for forming automobile tops—supervisory and executive staffs in by-product apparatus building plants—gas engine salesmen—makers of gages in liquid air manufacture—coke producers for calcium carbide—supervisors, clerks, foremen in phonograph record making plants—proofreaders checking material set by linotype—maintenance and repair men in plants making plastic molding equipment—parachute makers—mat makers using halftone plates—cash register maker clerical employees—electric tool and alloy steel salesmen—dyers engaged in rayon cloth manufacture—calcium carbide by-product salesmen, handlers—carbon black workers for rubber tire processing—announcers, speech trainers, ghost writers in radio work—workers producing crude oil for diesel motors—makers of masks and goggles for electric welders — refrigerating piping makers — clerical and office workers in seamless tube making plants—cash register designers—workers producing aluminum paint—engineers and firemen in plastic product plants—makers of control apparatus for electric furnaces—chemists in radium extracting plants—makers of panel instruments for automobiles—assemblers of complete radio—automobile repair men—steam turbine central station clerical workers—repair and service men in plants making gas engines—makers of carbon electrodes for electric furnaces—phonograph needle makers—automotive garage and repair shop workers—machinists, press operators, pattern makers in airplane plants—workers in plants making seamless tube mills—scrap sorters in reclamation of aluminum—electricians and furnace tenders and helpers in electric furnace operation—stainless steel salesmen—pattern makers in diesel engine plants—press operators for forming fenders—press operators making phonograph speakers—makers of welding rods used in electric welding—telephone operators—makers of exposure meters for photo-film photography—workers in photographic film producing plants—steam turbine electrical engineers—makers of thermometers, gages and other instruments used in making plastic parts for radios—acetylene welding school personnel—electrical equipment makers for phonograph record making—press repair gang in radio parts manufacture—liquid air salesmen—makers of fuel pumps for diesel motor oil—makers of altmeter, speedometers, air speed indicators, ground speed indicators, gyroscopes, radio apparatus, direction finders and de-icers for airplanes—makers of packaging containers for photo-film—foundrymen producing castings for automotive use—wholesalers of photo-film—acetylene cylinder fittings and gage makers—metallurgists in mechanical refrigerator plants—makers of leaf springs for automotive use—workers producing wood flour for plastic fillers—band saw designers, draftsmen, metallurgists—radio salesmen—state examiners for giving automobile license tests—steam turbine designers—chemists for plastic radio parts manufacture—makers of tin-foil for protection of photo-film—gasoline station attendants—developers of photo-film—machinery makers for recording master copy of phonograph records—makers of enlarging and developing apparatus for photo-film—chemical engineers engaged in photo-film production—supervisory and executive staff in photo-film making plants—makers of insulated booths for X-Ray apparatus—clerical employees, accountants, executives in liquid air plants—makers of road building machinery—makers of plastic parts for automobile steering wheels—toilet apparatus makers for airplane use—gage makers for gas engines—pattern-makers on electric welding machine parts—engineers and designers of by-product coke ovens and apparatus—workers in photo-film retailing establishments—bindery workers collating material set by linotype—workers engaged in inspection and testing complete radios—salesmen of aluminum metal shapes, sheets, bars, etc.—painters of automobile road signs—copyright checkers clearing music in phonograph record manufacture—electrical testers and inspectors of welding machines—telephone office and clerical workers—makers of etching tanks used in halftone process—pantograph makers for acetylene cutting apparatus—phonograph turntable makers—mine workers extracting radium bearing ore—skilled and unskilled labor in aluminum casting plants—tool and die makers in electric welding machine shops—X-Ray installation engineers—makers of tire valves—clerical staff for acetylene makers of equipment—tire repair kit makers—halftone film suppliers—acetylene generator makers—aeronautical engineers—acetylene lamp engineers—plastic material salesmen—airplane mechanics—telephone pole suppliers—automobile designers—assemblers of cash registers—paint spraying operators on automobile bodies—stainless steel metallurgists—order clerks, payroll clerks, time takers and rate setters in radio manufacturing—pipe line tube makers for transporting gasoline for automotive use—copyists engaged in preparing music for making phonograph records—linotype machine maintenance men—electric furnace designers—copper wire drawers making wire for electric welding machines—bauxite miners for aluminum production—technical staff in aluminum producing plants—technicians making radiographic inspections of heavy metal parts—workers engaged in cold-treating metals with liquid air—foremen in gas engine plants—phonograph testers—rayon transferred jobs from Japan to America in making of the rayon from raw materials to the thread—diesel motor salesmen—supervisory and executive forces in electric tool and alloy steel plants—power equipment operators and repair men in broadcasting stations—traffic light signals repair and maintenance men—manufacturers and workers producing high grade steel, aluminum and other alloys for airplanes—upholstery workers for finishing automobile interiors—nut and bolt makers for automotive use—fuel and compressed air requirements for making plastic radio parts—workers producing carbolic acids for phenolic plastics—airline stewardesses—cash register makers—makers of refrigerator motors and controls—polishers and finishers on cash register parts—packers and shippers of cash registers—telephone linemen—workers in plants making coke quenching cars—retail salesmen selling by-product coke—chemists in radium paint plants—mechanics and helpers in electric furnace making plants—acetylene generator salesmen—halftone screen makers—clerical workers in aluminum kitchen utensil factories—clerical workers in gas engine plants—makers of pressure cylinders for liquid air transportation—clerical and office workers in plastic product plants—office and clerical forces in electric tool and alloy steel plants—meteorologists for airplane service—designers of seamless tubing apparatus—composers engaged in composing music for making phonograph records—telephone service salesmen—makers of rubber tires for automobiles—research staff engaged in designing, investigating new materials and new principles in radio manufacture—rubber plantation workers for rubber tires—diesel motor engineers—designers of electric welding apparatus—refinery workers producing gasoline for automobiles—makers of precision tools and gages and instruments of all kinds for airplanes—makers of special thermos container for passenger meal service on airplanes—workers in stainless steel mills—tire dealers and sales forces—acetylene lamp draftsmen—weighers of raw materials to make rayon—linotype machine repair men—automotive engineers—phonograph instrument assemblers—makers of traffic light signals—cash register salesmen—acetylene lamp supervisors—calcium carbide-acetylene electric furnace electricians—acetylene lamp technicians—foundrymen in plants making gas engines—clerical and office workers in aluminum plants and sales offices—hospital technicians applying radium needles—punch and shear operators in airplane plants—makers of spark plugs for automotive use—tire repair station attendants—phonograph record album makers—makers of electrical wire for conducting electricity from steam turbine central station—die makers for phonograph record manufacture—type designers for linotype machines—executives and supervisors in electric welding apparatus making—shippers and handlers of seamless tubes—musicians employed in furnishing radio entertainment—supervisory and executive staffs in by-product coke plants—executives engaged in halftone engraving—calcium carbide-acetylene electric furnace maintenance men—acetylene welders—workers in plants supplying auxiliary equipment for diesel motor making plants—airplane draftsmen—supervisory and executive forces in stainless production and sales—engineers in rayon plants—X-Ray maintenance engineers—tool makers in airplane plants—arrangers engaged in preparing music for radio entertainment—makers of paper envelope makers for wrapping phonograph records—makers of equipment for protection against radium rays—foremen and technical supervisors of electric welding operations—makers of windshield wipers for automobiles—makers of sheet steel for automotive use—advertising and sales promotion workers engaged in tire advertising—makers of bearings for automobiles—maintenance and repair men in diesel motor plants—phonograph record packers—technicians in radium extracting plants—electric welding instructors—makers of upholstery fabrics for automobile interiors—testers of cash registers—airplane radio men—metallurgists in airplane plants—halftone production sales force—stainless steel rollers—chemists in rayon plants—makers of instrument for central station use—furnace tenders in seamless tube mills—makers of blank phonograph disks—radio testers—cash register branch office clerical employees—acetylene lamp designers—calcium carbide-acetylene furnace operators—makers of air compressor apparatus for pneumatic tire use—designers of electrically welded structures—makers of linotype machines—tourist cabin operators for housing automobile tourists—makers of protective equipment—helmets, gloves, special aprons leggings—acetylene cylinder fabricators and welders—workers on tire inner tubes—supervisory staff in radio manufacturing plants—buffing and polishing operators on automotive parts—telephone cable makers—makers of airplane motors—workers producing alloying elements for electric steels—tungsten, vanadium, cobalt, nickel, chromium, etc.—supervisory and executive forces in diesel motor making plants—pattern makers in plants making gas engines—shippers and packers in aluminum kitchen ware plants—type founders for linotype machines—makers of patterns for radio cabinets—cash register tool and die makers—airplane flying instructors—makers of wind tunnels for testing aircraft principles—photograph retouchers for improving halftone reproduction—makers of radio control room instruments—electric tool steel inspectors—rayon machinery repair men—makers of valves, gages and fittings for by-product coke processing—welders for joining automobile body parts—enamelers in refrigerator box plants—workers producing methyl alcohol for phenolic plastics—clerical workers in electric welding apparatus works—acetylene lamp makers—laborers in bauxite transportation—makers of paper for printing material set by linotype—diesel motor oilers—rubber mill equipment for tire making—workers producing amyl alcohol for plastic production—airplane model makers—machinists, forgers, molders, foundrymen, pattern makers, pipe fitters, assemblers in airplane plants—arrangers of music in phonographic record manufacture—makers of thermometers for use in rayon plants—press operators for making radio parts—makers of machine tools for automotive parts—metallurgists in automotive plants—air navigators—machinists working on automotive parts—clerical and office employees in electric furnace operating plants—workers engaged in gas engine inspection and testing—telephone engineers—automobile dealers and salesmen—testers of raw materials going into rayon manufacture—makers of electrical appliances using power from steam turbine central stations—maintenance and repair men in seamless tube production—press operators for phonograph record making—supervisory and other executives in plants making electric furnaces—automatic refrigerator compressor makers—supervisor and executive staffs in plastic molding equipment making plants—plastic product salesmen—electricians and maintenance men for tire fabric machines and molds—design engineers for liquid air equipment apparatus—sulphuric acid production for halftone etching—chrome and nickel miners producing materials for stainless steel—molders for electric welding machine castings—phonograph designers—maintenance and repair men in aluminum producing plants—ice machinery and equipment manufacturers—cash register engineers—shipping clerks in radio plants—salesmen in automobile accessory stores—acetylene production workers—suppliers and makers of machinery for making plastic radio parts—makers of equipment for inspecting heavy metal parts with radium—instructors in automobile driving schools—supervisory and executive forces in plastic product plants.

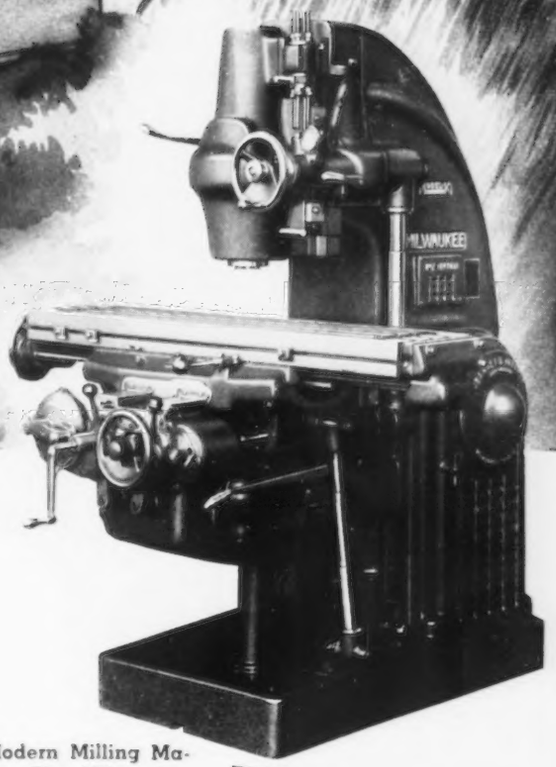
Modern LOCOMOTIVES

UTILITY AND BEAUTY CREATED WITH MODERN MACHINE TOOLS



STREAMLINED locomotives, air-conditioned cars, greater safety, speed and comfort in travel, dramatically testify to the progressiveness of the American railroads. Carrying out this enterprising program calls for modern machine tools. "Milwaukee" is a frequent choice of locomotive builders.

KEARNEY & TRECKER CORPORATION
MILWAUKEE, WISCONSIN, U.S.A.



A Modern Milling Machine—The Milwaukee Milling Machine — Model K Vertical

MORE THAN 41 years OF DOING ONE THING WELL

K&T

Milwaukee MILLING MACHINES

Announcing the 1939

MACHINE TOOL SHOW

THE GREATEST EXHIBIT OF THE TOOLS OF INDUSTRY EVER PRESENTED

Cleveland

OCTOBER 4-13, 1939

NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION

10525 CARNEGIE AVENUE, CLEVELAND, OHIO

EXHIBITS

The 195 exhibits, occupying 150,000 square feet of floor space, will display nearly 1,000 machines. These will include every type of machine tool in its most modern form, and in full operation . . . also many types of allied equipment and accessories. Every facility will be afforded visitors for careful, thorough inspection.

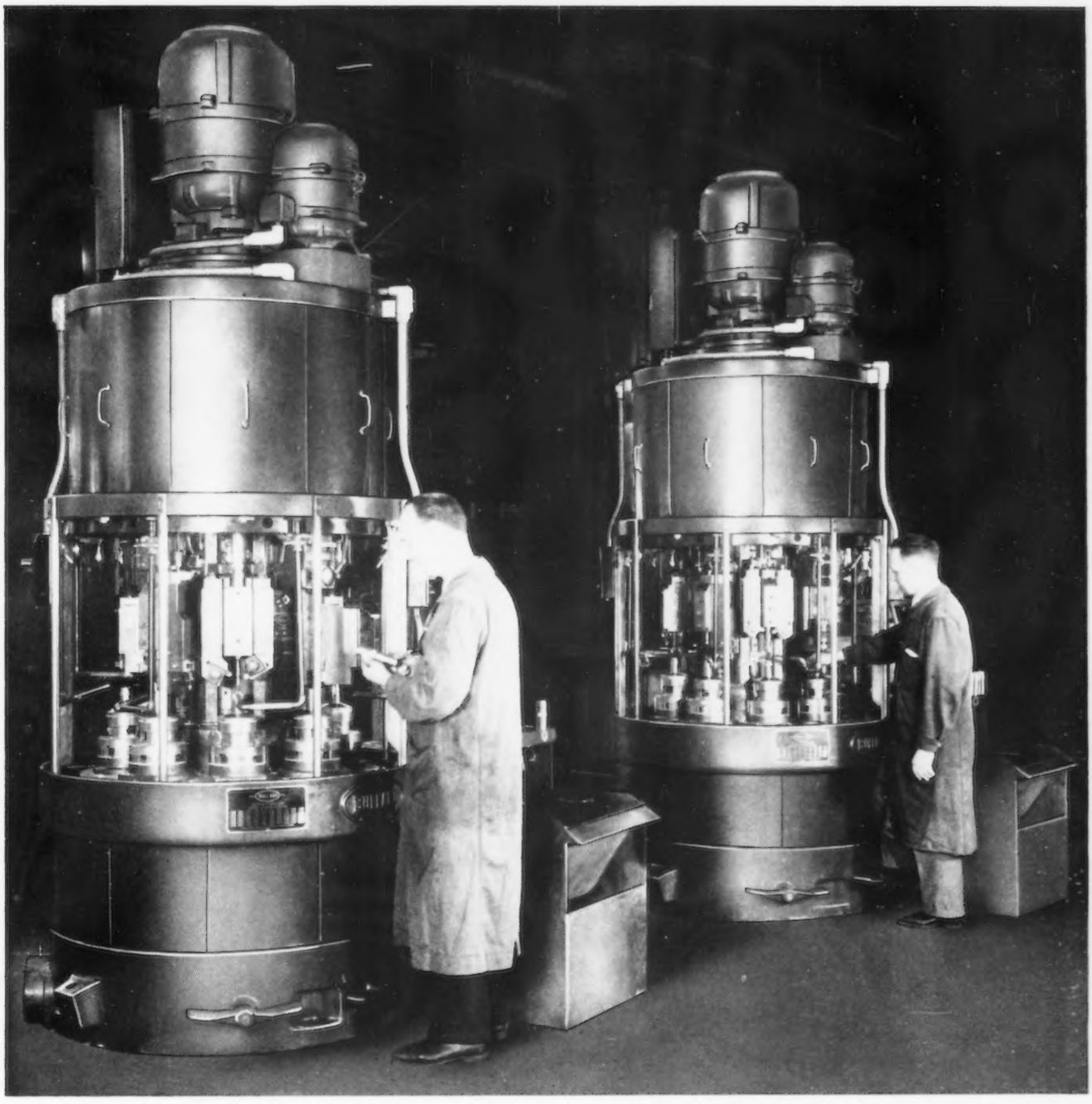
MACHINE TOOL CONGRESS

A Machine Tool Congress, sponsored by the professional engineering societies, will be held in evening sessions during the period of the Show. Foremost authorities will speak at the forum meetings of this Congress, on important developments in manufacturing methods.

ATTENDANCE

Attendance will be limited to qualified visitors. Admission to the Machine Tool Show will be by registration only. Among those attending will be officers and directors of manufacturing companies, operating executives, engineers, production men, buyers. More than 50,000 people visited the Machine Tool Show of 1935.

YOUR SMARTEST INVESTMENT TODAY . . . MODERN MACHINE TOOLS



Mult-Au-Matics Reduce Cost

Reduce Costs and you can **Reduce Prices.** **Reduce Frices** and you **increase Unit Sales.** **Increase Unit Sales Volume** to make **more manufacturing jobs, more administrative jobs, more selling jobs.**

Every manufacturer who turns, faces, bores, drills, reams or threads metal is a potential user of Mult-Au-Matics — if he has an urge to build a greater business. If you are such a man, ask a Bullard Engineer to study your production problems—without obligation, of course.

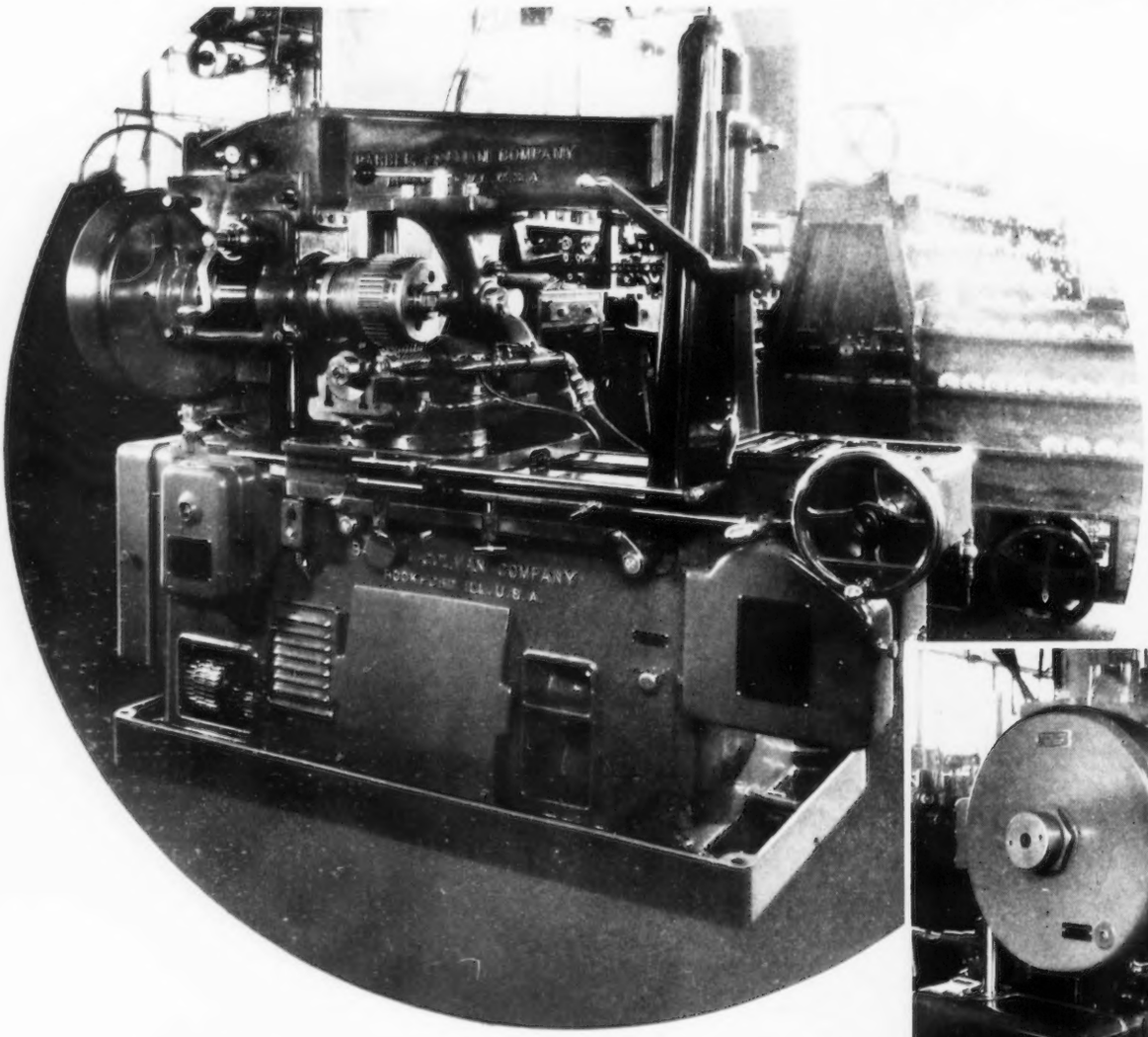
BULLARD

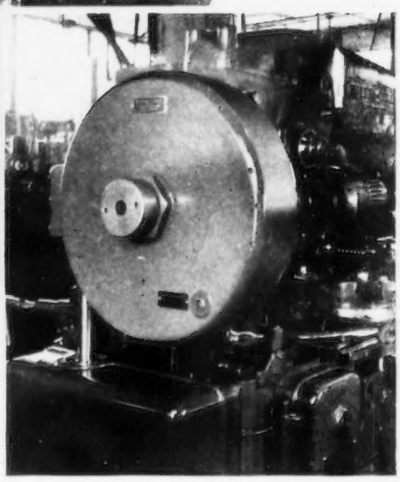
THE BULLARD COMPANY

BRIDGEPORT, CONNECTICUT

BARBER B-C COLMAN

Type A Hobbing Machine Saves Time on Tough Jobs





Heavy duty Hob Slide and Work Slide, with extra large index wheel, did the trick.

BARBER B-C COLMAN PRODUCTS

HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, MILLING CUTTERS, SPECIAL TOOLS

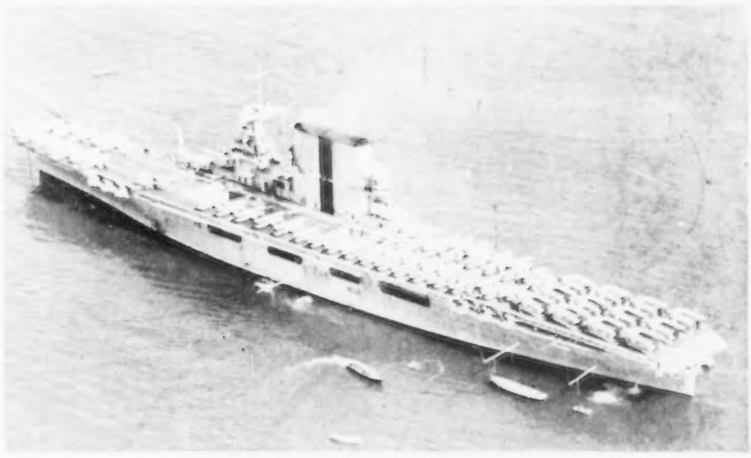
Material, production, and specially accurate indexing all combined to make a tough job out of hobbing mainshaft transmission gears . . . 5-6 pitch, 47 teeth; loaded two at a time, back to back for a total face of slightly more than 3". A Type A Hobbing Machine with extra heavy slides saves time on this exceptionally heavy work. A touch of Barber-Colman Engineering in the application of an extra large and accurate drive to the work-spindle mastered the remainder of this tough job. Write for the figures, and complete information on this machine.

For bigger and tougher work, Type D. For smaller work, several sizes down to Type S. For all hobbing . . . Barber-Colman Hobs, and Engineering Service. Investigate.

BARBER-COLMAN COMPANY

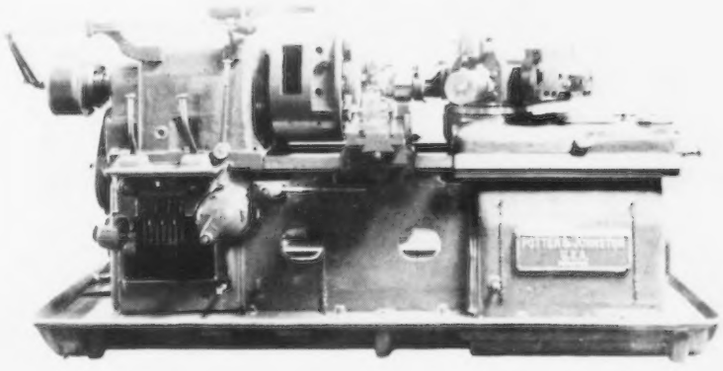
General Offices and Plant ROCKFORD, ILLINOIS, U. S. A.

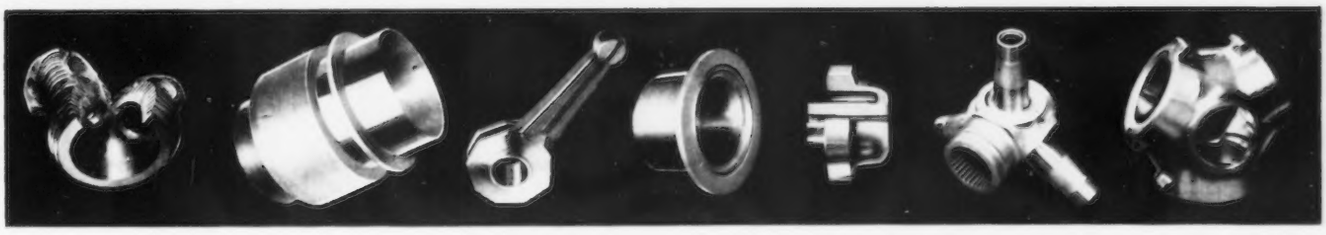
THE EYES OF THE FLEET POWERED WITH DEPENDABLE ENGINES



AMERICAN AND OVERSEAS PREMIER AIRCRAFT ENGINE MANUFACTURERS EMPLOYING POTTER & JOHNSTON AUTOMATICS ACHIEVE UNBEATABLE RESULTS

Machining problems arise in the Aircraft Industry which are peculiar and numerous. More often than not, they include a combination of alloy steels—large amounts of stock to be removed—many involved operations on one piece—high hardness readings — usually close limits of accuracy — extremely fine finish requirements—all of which call for not only a versatile and economical machine tool, but considerable cooperation between the manufacturer and the machine tool builder. P. & J. Automatics have proven outstanding for solving the problems for this class of work. They are especially designed for high production, with versatile tooling facilities.





POTTER & JOHNSTON MACHINE CO.

PAWTUCKET, R. I.

FACTORY REPRESENTATIVES: William L. Martin, Headquarters at Pawtucket, New England States and Eastern New York & New Jersey; A. W. Stone, 586 Kenyon Ave., Plainfield, N. J.; Western New York & New Jersey, Eastern Pennsylvania, Maryland, and Delaware; G. Tell DuBois, 8-134 General Motors Building, Detroit, Michigan; Michigan and the City of Toledo, Ohio; Louis K. Voelk, 13011 Woodworth Road, East Cleveland, Ohio; Ohio—with the exception of Toledo, and Western Pennsylvania; Harry L. Schuster, 743 North Fourth Street, Milwaukee, Wisconsin; Illinois, Missouri, Wisconsin, Iowa and Indiana. **AGENCIES:** Star Machinery Company, 1711 First St., South, Seattle, Washington; Heiser-Morgan Machinery Co., 2926 Santa Fe Ave., Los Angeles, Calif.; Jenison Machinery Co., 20th & Tennessee Sts., San Francisco; Wessendorff, Nelms & Co., Inc., 317 Preston Ave., Houston, Texas; Arthur Jackson Machine Tool Co., 60 Front Street West, Toronto 2, Ontario, Canada; Arthur Jackson Machine Tool Co., 137 Grosvenor Ave., Montreal, Canada; Burton, Griffiths & Co., Ltd., Birmingham, England; R. S. Stokvis et Fils, Paris, France; Rotterdam, Holland; and Brussels, Belgium; Maskinaktiebolaget Karlebo, Stockholm 1, Sweden; Ing. Ercole Vaghi, Milano, Italy; Yamatake & Co., Ltd., Tokyo, Japan; Imperial Export Co., 11 Whitehall St., New York, N. Y.; Almanco, Zurich, Switzerland; Be-Te-Ha, Warsaw, Poland; Schuchardt et Schutte, Budapest, Hungary; Bourla Freres, Istanbul, Turkey.

POTTER & JOHNSTON MACHINE CO.
Pawtucket, R. I.

Please send us your new catalog giving full specifications of your 5-D Power-Flex model Automatic Chucking and Turning Machine.

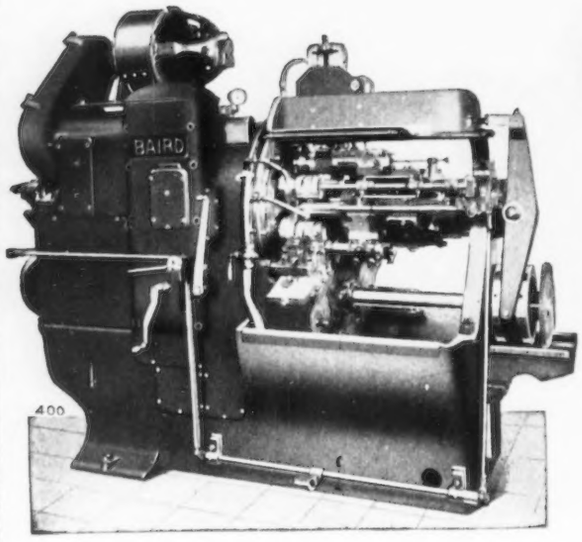
Company .....

Address .....

Individual .....

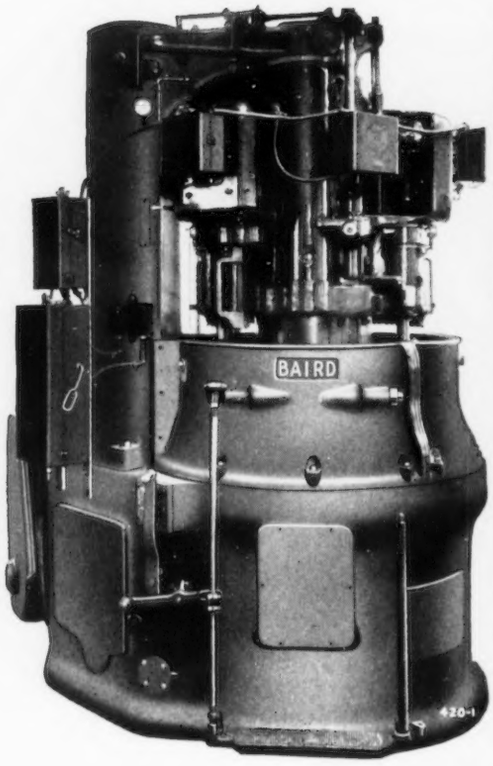
ACCURATE – SPEEDY PRODUCTION MACHINES BY

AUTOMATIC BAIRD MACHINERY



This picture shows a **BAIRD 7" SIX SPINDLE HORIZONTAL AUTOMATIC LATHE.**

The machine may be arranged for chucked work or for work to be turned on centers and with or without one or more cross slides as well as the five longitudinal tool slides for ordinary turning operations and also arranged to drill one or more holes or to mill or thread or tap and to include a sandpapering or Tuffing operation and loading and unloading devices **AS THE JOB REQUIRES.**



This picture shows a **BAIRD 11" EIGHT SPINDLE VERTICAL AUTOMATIC INTERNAL GRINDER.**

At each station a wheel is provided of the size, grade and speed best for the work to be done at each station.

Each wheel is independently dressed and sized or positioned at each cycle and only according to the need of each, hence least cost for wheels.

Work having two diameters may have wheels arranged for both.

BOTH OF THESE BAIRD MACHINES

Have Automatic Controls

REQUIRE LEAST WORK BY OPERATOR.

Have Spindle Speeds and Tool Feeds best for each part of each job.

Have Mechanical Chucks requiring neither fluid nor air.

BAIRD Mechanical Chucks have a Maintained, Adjustable Gripping Pressure, a very important point as it practically eliminates the chance of work becoming loose in the chucks.

Have Totally Enclosed Mechanism with Forced Feed Lubrication and High Speed yet Smooth Indexing so that production time is reduced to a minimum.

May be set up **DOUBLE-INDEXING** which permits of a piece of work being finished from both ends by being passed through the machine a second time but in continuous operation.

This **BAIRD PATENTED TURN-AROUND METHOD** can be used on the **BAIRD GRINDER** to grind from both ends of the work and different diameters if so wanted.

Double Indexing also allows of two pieces of the same work being loaded and unloaded at each cycle, the two pieces being operated on in the same way at the same time.

These methods save handling, floor space, storage &c., and help in the checking of the work.

Baird Machines thus reduce costs and thereby increase sales and make more work.

"Ask Baird About It"

THE BAIRD MACHINE COMPANY

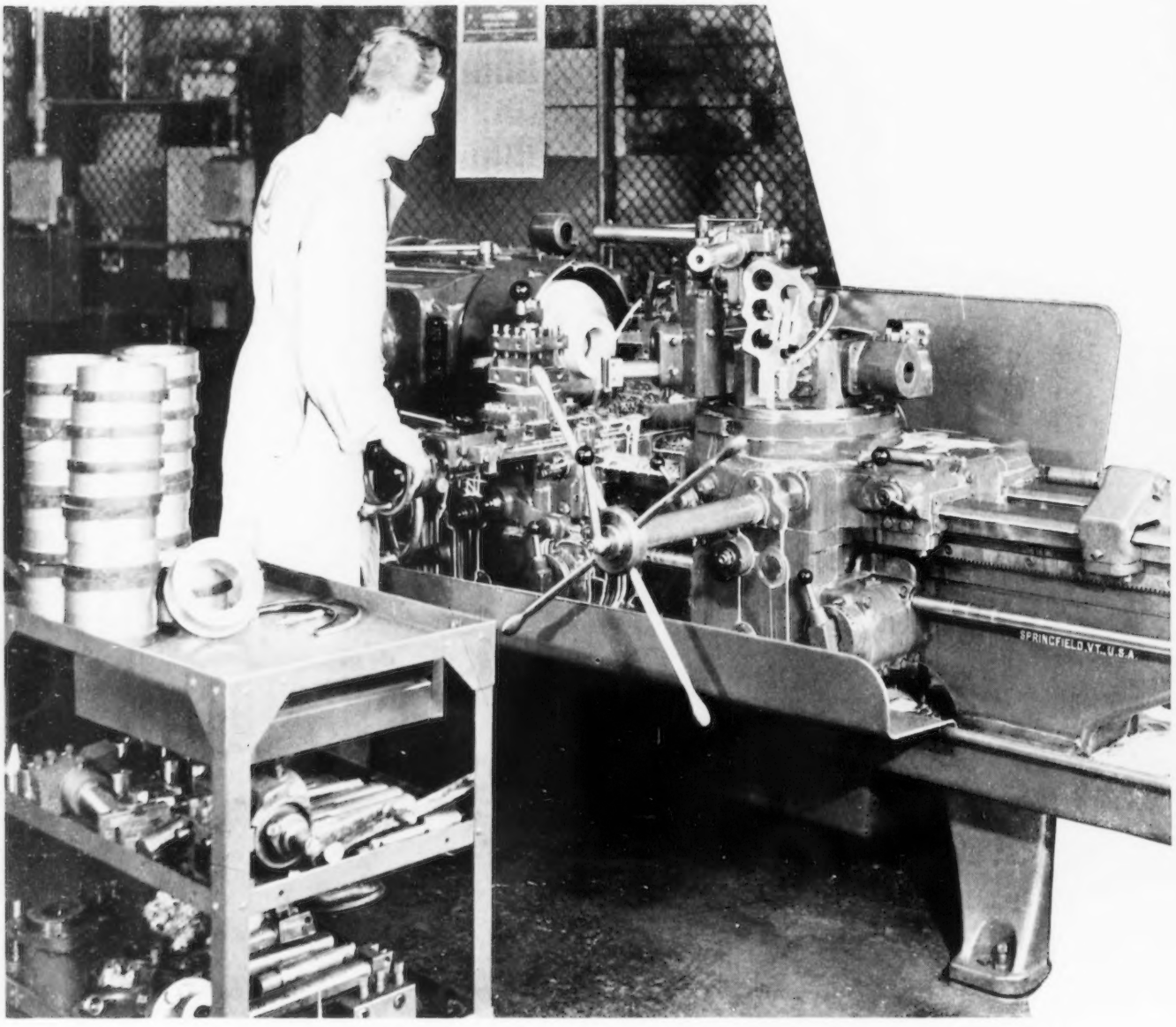
BRIDGEPORT, CONN.

Production Pace Maker

by LeBLOND

A slicing machine company, using the LeBlond Rapid Production Lathe shown above, now slices hours off machine time by the faster loading and unloading feature provided on each lathe in the complete line: 4-way 11-inch, and the 16-inch and 19-inch LeBlond Rapid Production Lathes. Numerous attachments not only cut production time but also widen the range of work. Where specially built equipment is required on the job, LeBlond Rapid Production Lathes will do the work better, faster, cheaper. For complete details write for "Doubling Production Per Hour" booklet — it's free. Address Dept. L-23.

THE R. K LeBLOND MACHINE TOOL CO.
CINCINNATI, OHIO



5 MINUTES *Saved* PER PIECE

THE J&L Saddle Type Turret Lathe is saving 5 minutes per piece on the first operation on small lots of ring nuts like the one shown above. . . . This piece is $5\frac{3}{4}$ inches in diameter and 2 inches wide. The material is steel, similar to X-1335. The small quantity makes forging costs prohibitive, therefore sawed blank discs are used. The first operation consists of coring out the bore, turning two diameters in the bore, facing the end, and turning $1\frac{3}{8}$ inches on the outside diameter. . . . Faster time, finer finish, and less operator fatigue are but a few of the J&L characteristics which will show on the balance sheet. . . . In several instances one new J&L Universal Saddle Type Turret Lathe has replaced two, and sometimes three, obsolete turret lathes. A survey in your own shop by a J&L engineer costs you nothing.

JONES & LAMSON MACHINE CO., SPRINGFIELD, VERMONT, U. S. A.

on This Kind of Work with the *GISHOLT SPEED SELECTOR*

UNIT machining costs are no less important on the small lot jobs than on the big ones—but they *are* more difficult to reduce. In this shop, on numerous parts made of steel, bronze, cast iron, cold rolled bar stock, etc., they found how to do it—with the Gisholt No. 4 Ram-type Universal Turret Lathe, equipped with the Speed Selector.

The speed and accuracy of this machine, with the simple pre-selection of various spindle speeds, saved 50% on this class of work. That's a lot when parts come in small quantities! On larger volume, Gisholt machines, equipped with Speed Selectors, are cutting costs as much as 30%, 40% and 50%, and even more. If you want savings like these, ask about the Gisholt Speed Selector.

The Gisholt Speed Selector is the simplest, most efficient control ever devised for providing selective, automatic speed changing. All speed changes may be made without stopping the spindle or releasing the main drive clutch. The operator merely sets a dial to the diameter of the cut and the machine automatically shifts to the proper speed.

★

This bulletin describes the Gisholt Speed Selector and its application on various types of work.

If you haven't a copy, ask for it now.

YOUR SMARTEST INVESTMENT TODAY — BETTER MACHINE TOOLS

GISHOLT

GISHOLT MACHINE COMPANY

1215 EAST WASHINGTON AVENUE, MADISON, WISCONSIN, U. S. A.

TURRET LATHES · AUTOMATIC LATHES · TOOL GRINDERS · BALANCING MACHINES

THE GOOSE

with the

GOLDEN EGGS

AN AESOP FABLE

A certain man had the good fortune to possess a goose that laid him a Golden Egg every day. But dissatisfied with so slow an income, and thinking to seize the whole treasure at once, he killed the Goose; and cutting her open, found her just what any other goose would be!

Industry is the goose which lays the golden eggs, but the egg crop is not produced by any magic process.

Industry must use machinery to produce golden eggs, but the goose must be nurtured, carefully tended and otherwise encouraged or it will stop laying. With extended hands all are waiting to catch the golden eggs laid by industry.

The eggs are sorely needed, as there are only half enough to go around. ***Then Why Kill The Goose?***

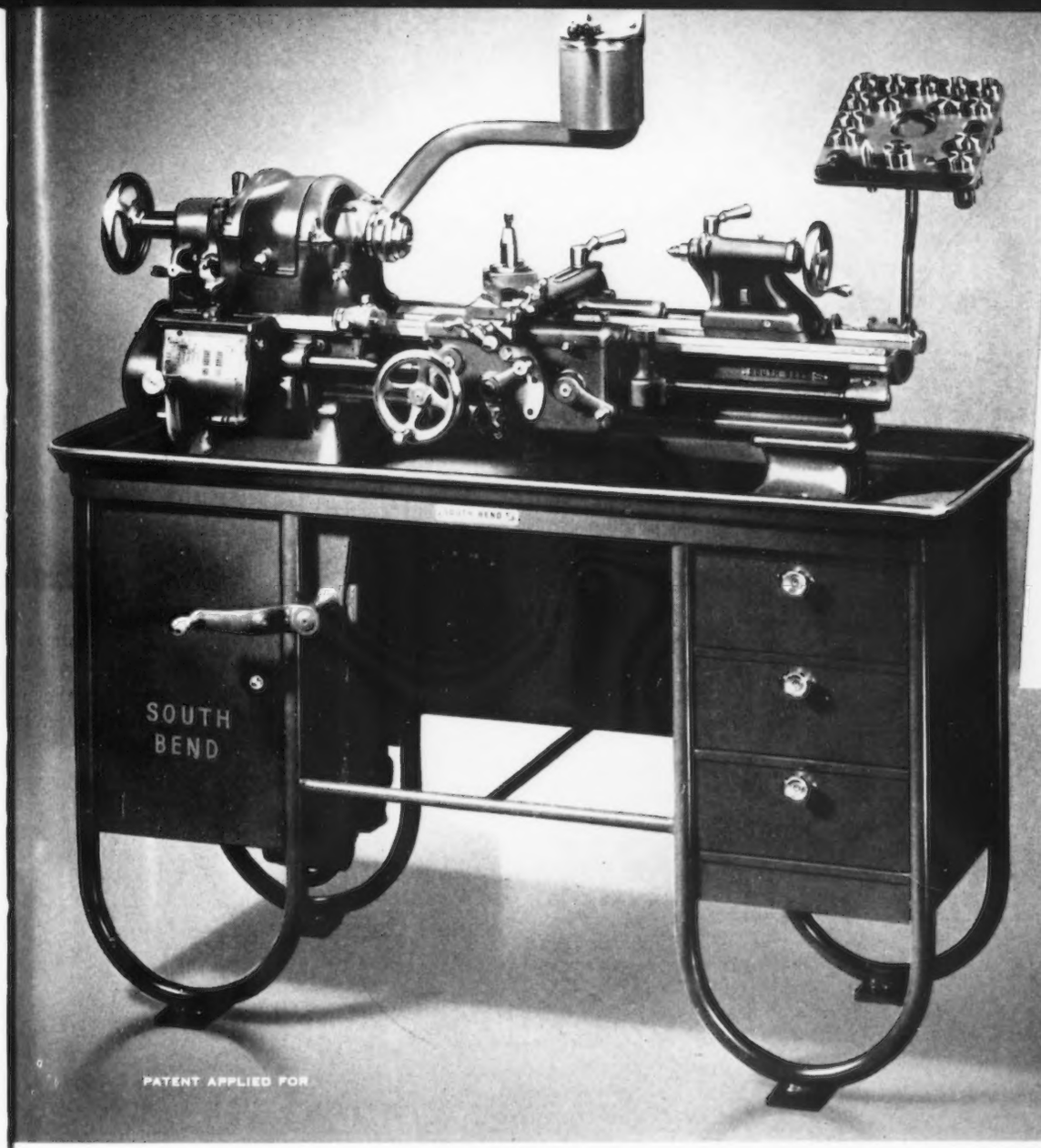
THE LUCAS MACHINE TOOL COMPANY

Makers of the LUCAS "Precision" Horizontal Boring, Drilling & Milling Machine

NOW AND ALWAYS OF Cleveland, Ohio

NEW SOUTH BEND 1" COLLET LATHE

- 9" SWING OVER BED
- 1⅜" SPINDLE HOLE
- 12 SPINDLE SPEEDS
- POWER CROSS FEED
- POWER LONG. FEED
- SCREW THREADS 4 TO 224 PER INCH



1" Collet Capacity 9-inch Swing South Bend Underneath Belt Motor Drive Quick Change Gear Tool Room Precision Lathe. Mounted on all steel welded bench. ¾ H. P. instant reversing ball bearing motor and 12-speed drive are enclosed in left side of bench.

THIS new 1" collet capacity 9-inch swing back-geared, screw-cutting lathe has the time saving features of an engine lathe combined with the sensitivity and accuracy of a fine precision collet lathe. It is capable of the most exacting tool and instrument work, and has the power and rigidity for taking heavy cuts on high speed production operations.

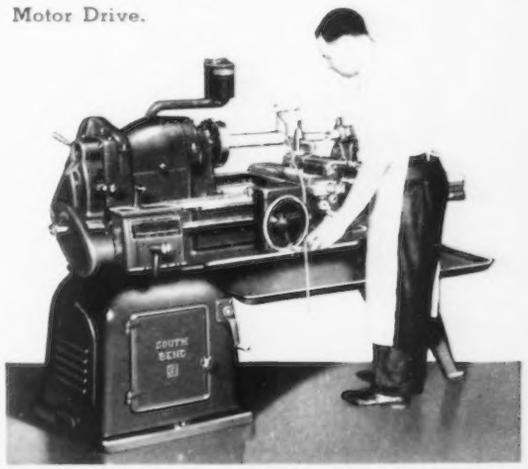
Tool Room Attachments as illustrated include hand wheel draw-in collet chuck attachment, telescopic taper attachment, micrometer carriage stop, thread dial indicator, and collet rack.

Manufacturing Attachments available include hand lever draw-in collet chuck attachment, semi-automatic hand lever bed turret, double tool rest, automatic carriage stop, four-way tool post turret, oil pump, piping.

Immediate Delivery can be made on all popular sizes of South Bend Lathes from dealer display stocks in principal cities; a few are listed below.

68 Sizes and Types of Lathes

9", 11", 13", 14½", and 16" Swing.
3' to 12' Bed Lengths.
Countershaft Drive.
Motor Drive.



16" x 6' Underneath Belt Motor Drive Lathe

Send For Illustrated Catalog

TRADE MARK SOUTH BEND TWINS ENGINE LATHES

ON DISPLAY IN PRINCIPAL CITIES

Boston, Mass. — The MacKenzie Machinery Company
Buffalo, N. Y. — J. L. Osgood Machinery & Tool Co.
Chicago, Illinois — C. B. Burns Machinery Company
Cleveland, Ohio — Reynolds Machinery Company
Detroit, Michigan — Lee Machinery Company, Inc.
Los Angeles, Calif. — Eccles & Davies Machinery Co.
Milwaukee, Wis. — W. A. Woell Machinery Company
Newark, N. J. — J. E. Edwards Machinery Company
New York, N. Y. — A. C. Colby Machinery Company
Philadelphia, Pa. — W. E. Rapp, Machinery
Providence, R. I. — Geo. T. Reynolds & Son, Inc.
San Francisco, Calif. — Moore Machinery Company
Seattle, Washington — Star Machinery Company

SOUTH BEND LATHE WORKS

Lathe Builders Since 1906

588 E. Madison St., South Bend, Indiana, U. S. A.

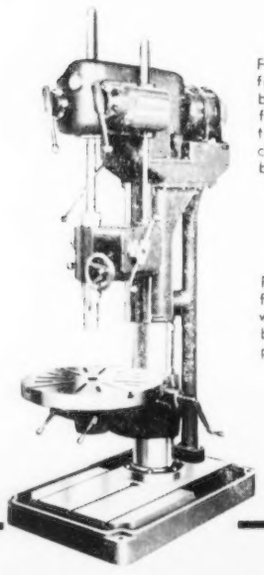
CLEEREMAN

MEETING SPRINGFIELD ARMORY'S DEMAND FOR ACCURATE DRILLING

This new 25" CLEEREMAN DRILLING MACHINE is a valuable addition to the tool room in the Hill Shop of the Springfield Armory. Here we see it drilling a 5/16" hole in a steel forging at a spindle speed of 825 r.p.m.

CLEEREMAN DRILLING MACHINES are available in a standard range of sizes from 21" to 30" and in capacities up to 1½" in S.A.E. 1035 steel. They are fast, accurate, convenient; and pay for themselves through more and better work at lower cost.

Call in our engineers to analyze your drilling operations and to offer practical suggestions for handling your work at savings over your present methods.

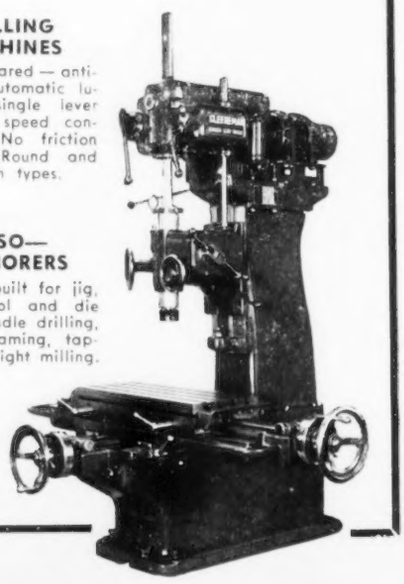


DRILLING MACHINES

Fully geared — anti-friction — automatic lubrication — single lever feed and speed controls. No friction clutches. Round and box column types.

ALSO— JIG BORERS

Precision built for jig, fixture, tool and die work. Handle drilling, boring, reaming, tapping and light milling.



MANUFACTURED BY

CLEEREMAN MACHINE TOOL CO., GREEN BAY, WISCONSIN

ADDRESS MANUFACTURER'S SALES DIVISION

BRYANT MACHINERY & ENGINEERING COMPANY

400 WEST MADISON ST., CHICAGO

REPRESENTED BY DEALERS IN PRINCIPAL CITIES

THE WORK MUST COME *first*

DOING A FULL-TIME JOB

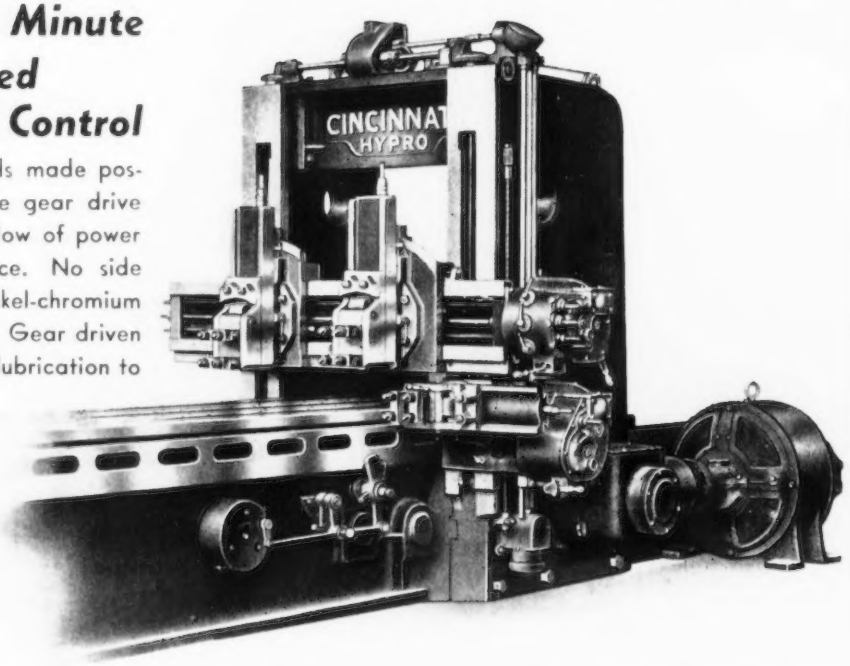
This Master SUPER SERVICE Radial with 10' arm, and 26" diameter column, is stepping up the production of punch presses with cast steel frames in the plant of the *Niagara Machine & Tool Works, Buffalo, N. Y.* The special base was installed by the customer, who feels that his investment has been more than justified by this giant tool—one of the many in the CINCINNATI BICKFORD line that lower production costs through faster, smoother operation, and more uniform work.

THE CINCINNATI BICKFORD TOOL CO.

OAKLEY, CINCINNATI, OHIO, U.S.A.

NEW HIGH SPEED PLANERS

8 to 240 Feet Per Minute
Complete Centralized Pendant Control



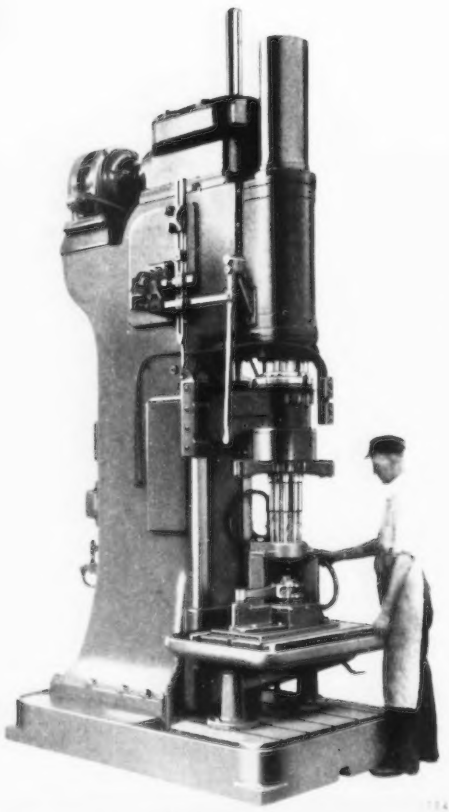
Greater cut and return speeds made possible by a balanced herringbone gear drive which provides a smooth even flow of power through a greater tooth surface. No side thrust bearings required. Nickel-chromium alloy steel gears and steel rack. Gear driven pump provides positive pressure lubrication to bed ways and bearings with spray lubrication to gears.

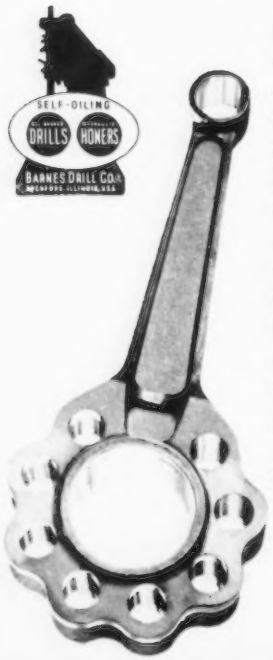
All of which means a better class of finish on all types of work produced in much shorter time.

Send for your free copy of our new Hypro bulletin.

THE CINCINNATI PLANER COMPANY CINCINNATI, OHIO, U. S. A.

Use Hydrams for Accurate, Heavy Boring and Drilling





Hydram Drilling Machines, built in three sizes by the Barnes Drill Co., are notably successful on a wide variety of boring and drilling operations which require unusually smooth, powerful drives and hydraulic feeds. The H-4 Hydram Drilling Machine shown at left is one specific example. It has a multiple spindle head for boring simultaneously the knuckle pin holes in airplane engine master connecting rods of the type illustrated. Hydrams, and Self-Oiling All-Geared Drilling Machines, are used for many other operations in airplane, automobile, truck, tractor, and other types of manufacturing . . . Write today for photographs and data. Quotations on specific operations supplied promptly on receipt of drawings and production requirements.

Honing Machines made by the Barnes Drill Company are available for most accurate, easy, economical finishing of any hole, bore or cylinder which can be honed, and for a variety of external honing operations.

BARNES DRILL CO. 815-831 CHESTNUT STREET ROCKFORD, ILLINOIS, U. S. A.

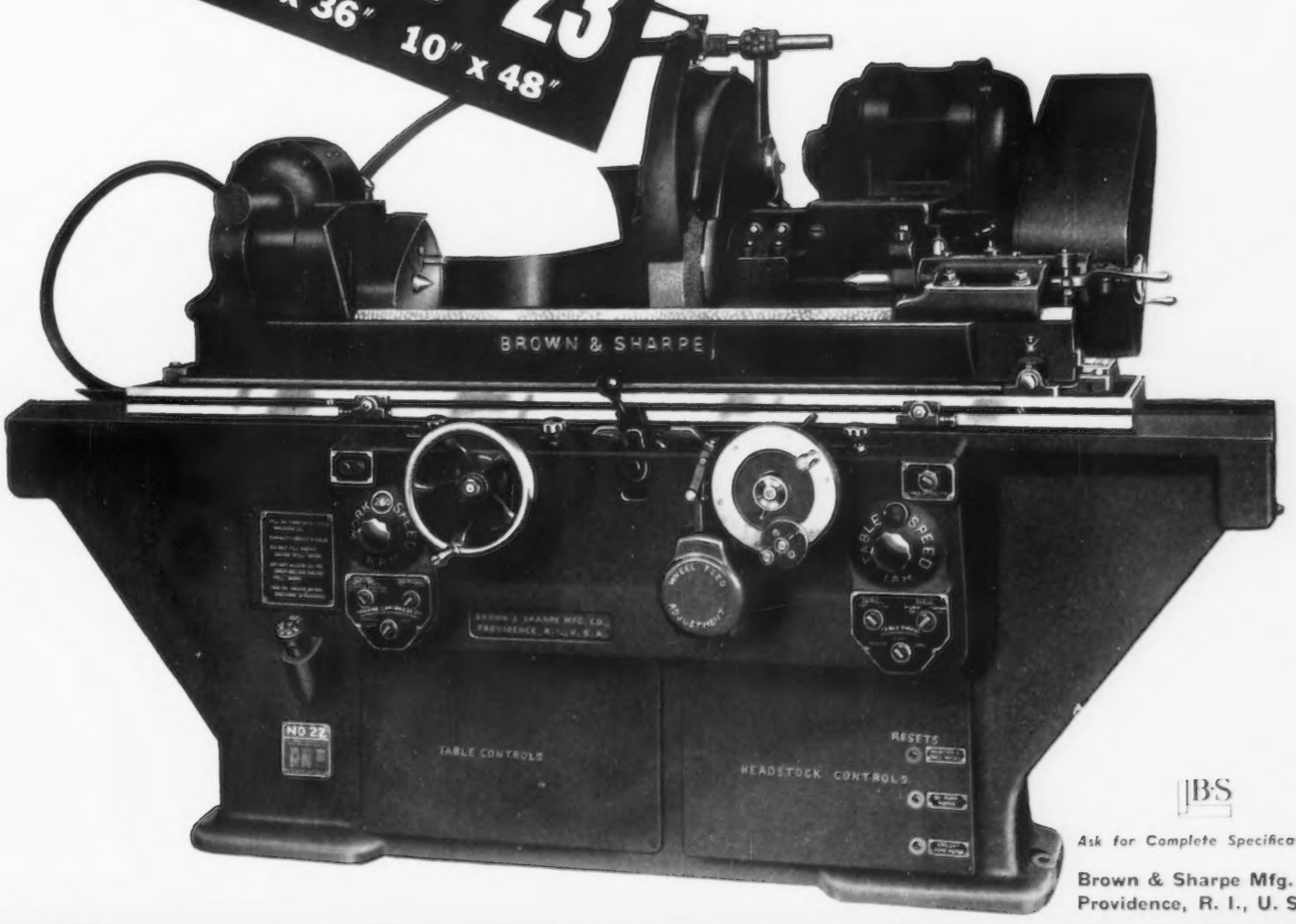
PRODUCTIVE
PLAIN GRINDING MACHINES
for High Accuracy and Fine Finish —

Nos 20-22-23

10" x 18" 10" x 36" 10" x 48"

Electrically Controlled

. . . powerful production units — with new time- and labor-saving features through flexibility of the electrical control.

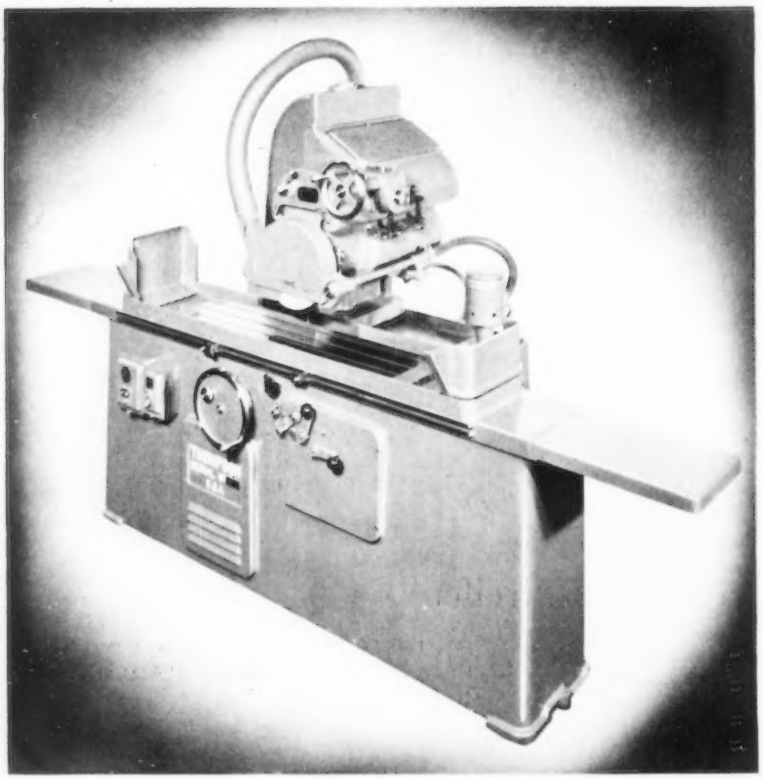


B·S

Ask for Complete Specifications

Brown & Sharpe Mfg. Co.
Providence, R. I., U. S. A.

BROWN & SHARPE



Every Hour Saved

HELPS TO MAKE MORE JOBS!

The American standard of living simply means the ability to purchase more goods per dollar. This is made possible by the use of time-saving machinery in the factory.

Thompson Hydraulic Surface Grinders contribute to this time-saving. They are up-to-the-minute in vibrationless construction. They are ahead of the times in several vital features.

On this machine the wheel is always true and free-cutting because it is trued automatically. Hydraulic table speed is 100 feet per minute without shock. It grinds faster and surface finish of work is smoother. Write for description of these amazing hydraulic surface grinders.

THE THOMPSON GRINDER COMPANY • SPRINGFIELD, OHIO

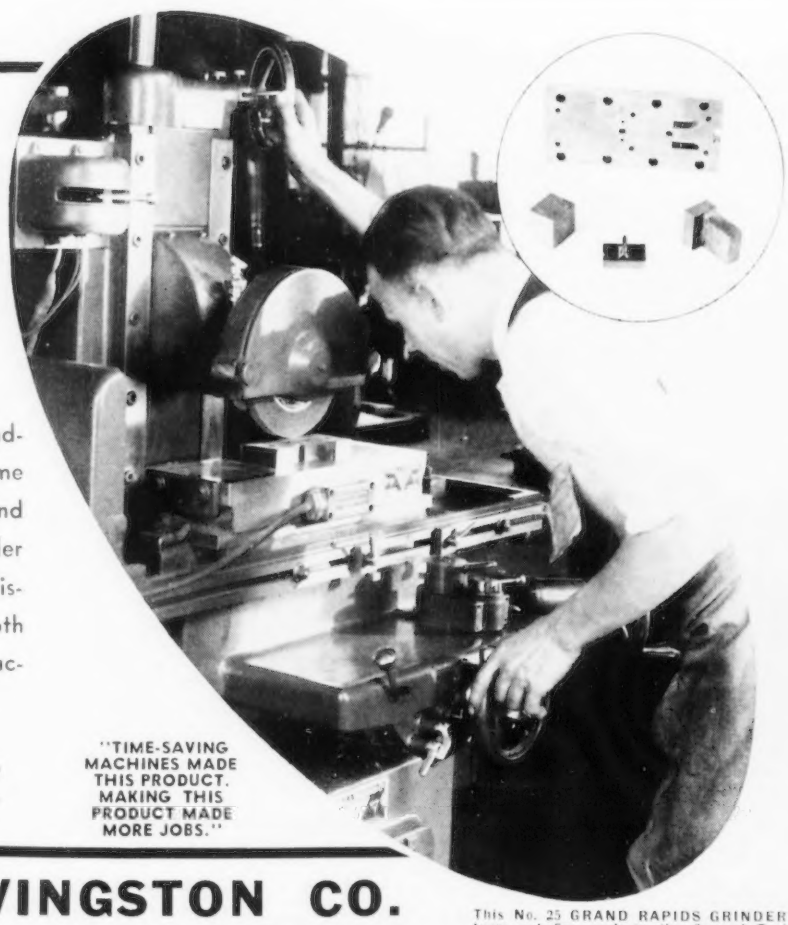
One of Many Jobs Well Done with

GRAND RAPIDS

HYDRAULIC FEED SURFACE GRINDERS

GRAND RAPIDS Hydraulic Feed Surface Grinders are ordered again and again by the same plants. Speed, ease in operation, accuracy, and the endurance required by continuous work under exacting conditions, all contribute to the satisfaction they give. This grinder has the smooth high speed that you need to do the finest accurate work.

Send for the new catalog GL-100 illustrating the latest in hydraulic feed surface grinders.



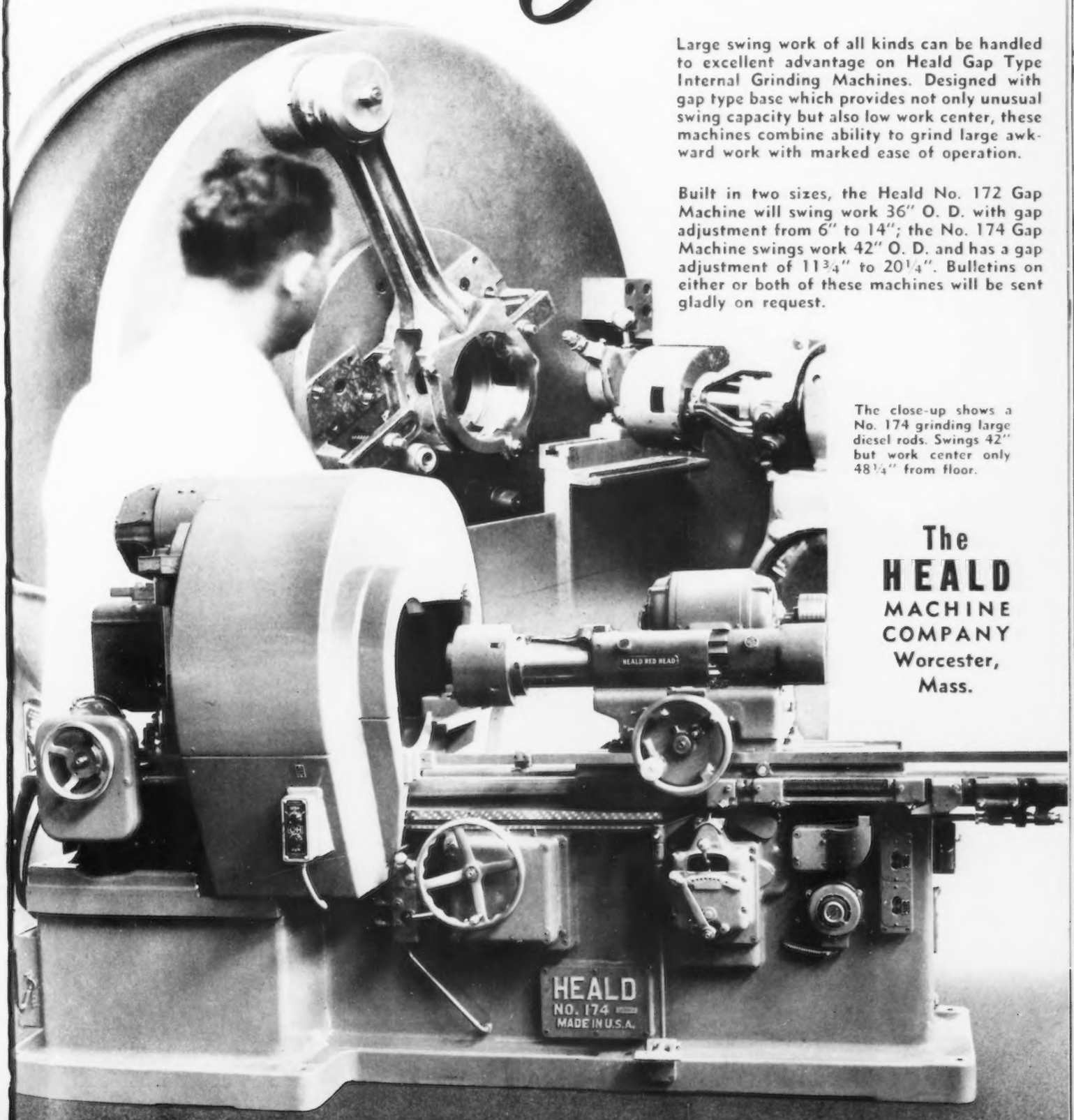
"TIME-SAVING MACHINES MADE THIS PRODUCT. MAKING THIS PRODUCT MADE MORE JOBS."

GALLMEYER & LIVINGSTON CO.

303 STRAIGHT AVE., S.W. **GRAND RAPIDS, MICHIGAN**

This No. 25 GRAND RAPIDS GRINDER turns out fine work in the General Tool Room of a large plant. Its performance has led the owner to order several more.

HAS THE *Swing* PLUS UNUSUAL OPERATING *Convenience*



Large swing work of all kinds can be handled to excellent advantage on Heald Gap Type Internal Grinding Machines. Designed with gap type base which provides not only unusual swing capacity but also low work center, these machines combine ability to grind large awkward work with marked ease of operation.

Built in two sizes, the Heald No. 172 Gap Machine will swing work 36" O. D. with gap adjustment from 6" to 14"; the No. 174 Gap Machine swings work 42" O. D. and has a gap adjustment of 11¾" to 20¼". Bulletins on either or both of these machines will be sent gladly on request.

The close-up shows a No. 174 grinding large diesel rods. Swings 42" but work center only 48¼" from floor.

The HEALD MACHINE COMPANY Worcester, Mass.

USE A *Heald* FOR PRECISION • PRODUCTION • PROFIT

Photo courtesy Braeburn Alloy Steel Corporation, Braeburn, Pa.

PUT NORTON RESEARCH TO WORK

Cutting Your Grinding Costs

A product of modern research—that's a true description of Norton Resinoid Wheels for billet and foundry grinding. In the Norton laboratories there's a group of scientists that specializes in resinoid bond development. Not only have they made many important improvements in the bond formulae but have also developed an elaborate control system that improves production quality and uniformity.

These laboratory developments coupled with an entirely new production department with the very latest available equipment have resulted in new standards of quality for resinoid wheels—wheels that are cutting billet and foundry grinding costs. Let Norton engineers study your jobs and give you the benefit of these improved wheels.

NORTON COMPANY
WORCESTER, MASS.

New York Chicago Detroit
Philadelphia Pittsburgh Hartford
Cleveland Hamilton, Ont.
London Paris Corsico, Italy
Wesseling, Germany

W-711

NORTON ABRASIVES

Did you ever hear of Shredded Whale?

Problem: For years the brethren of Moby Dick have been hunted and killed for the oil obtained from the whale blubber. But valuable as was this oil, its use was limited because of its odor. The old method was to boil the oil out of the blubber in huge cauldrons. What was needed was an improved method of extraction.

Answer: A better method has been found. In the autumn when the fleet of whaling vessels sails out of Oslo, Norway, bound for the Antarctic Seas, many of the ships carry a grinder-stand equipped with twenty-four-inch Carborundum Brand grinding wheels. Chunks of whale blubber are now ground . . . or shredded . . . on these wheels. The resultant pulp is put into a centrifuge for the extraction of a pure, odorless, tasteless oil which now has a much wider usefulness.

Thus is written another interesting chapter in the story of grinding by Carborundum. Another example of the accomplishments of Carborundum that extend from the frozen Antarctic to the tropics, from the shredding of soft blubber to the sharpening of exceedingly hard cemented carbide tools. Not to mention the 1001 grinding jobs on parts, castings, tools, rolls, etc., etc . . . on a wide variety of materials . . . throughout all industry.

AN INVITATION TO EXECUTIVES CONCERNED WITH MANUFACTURING

Whatever you make, there are two ways in which The Carborundum Company's Abrasive Service can help your company. Highly trained abrasive engineers are ready to help solve any special grinding or finishing problem that may confront you. Also, without obligation, they will study your present abrasive set-up, report on its efficiency, and wherever possible, indicate how production can be improved or savings effected. Write to The Carborundum Company, Niagara Falls, N.Y., and a representative will call.

CARBORUNDUM
BRAND
ABRASIVE PRODUCTS

FOR ACCURACY AND ECONOMY IN MANUFACTURE

SEE THE CARBORUNDUM EXHIBIT, BOOTH 2228, MACHINE TOOL SHOW, OCTOBER 4–13, 1939

Don't kill the goose that laid the GOLDEN EGG!

MARVEL

In 1870 the population of the United States was less than one-third of that of today. In 1870 about 54% of the working population was engaged in agricultural pursuits, while only about 21% was engaged in manufacturing and mechanical occupations. Then came the great increase in population, and where did the increased population find employment? Unquestionably in manufacturing and the service industries created or expanded by manufacturing industries, which today employ approximately 78% of our working population. Between 1900 and 1930, which was the period of most intensive mechanization and industrial expansion, 20 million new jobs were created, which increase in jobs was equivalent to 422 jobs for each 1,000 of new population.

Cost-saving and automatic production machinery employed by industry has not only increased employment but has also raised the American Standard of Living to a point unequalled in world history!

To criticise the use of the falsely-named "labor-saving machinery" is to KILL THE GOOSE THAT LAID THE GOLDEN EGG,—to endanger the foundation of a system that is continuing to deliver automobiles, telephones, electric light, radios, refrigerators, movies, etc. to a greater and greater proportion of our population.

As creators of a SYSTEM of METAL SAWING that has contributed much to the lowering of manufacturing costs of many luxuries of American life, MARVEL has not only served industry, but has served America well.

MARVEL SAWING MACHINES

General Purpose Saws
No. 1 (Capacity 6" x 6")
No. 2 (Capacity 8" x 8")

Light High Speed Saw
No. 4B (Capacity 6" x 6")

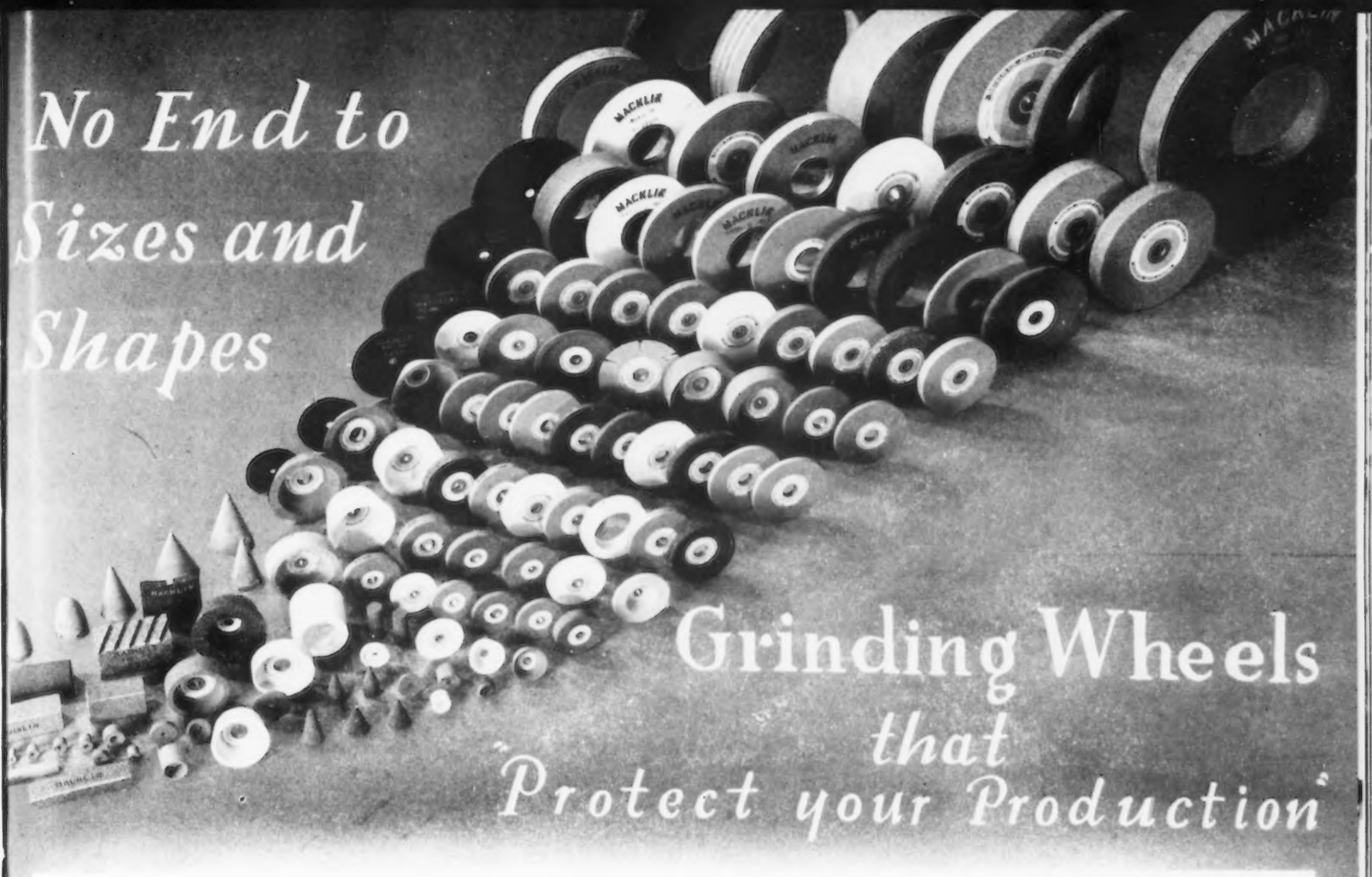
Heavy-Duty High Speed Saws
No. 6 (Capacity 6" x 6")
No. 9 (Capacity 10" x 10")

Automatic Production Saws
No. 6A (Capacity 6" x 6")
No. 9A (Capacity 10"x10")

Metal Band Saw
No. 8 (Capacity 18" x 18")

Giant Hydraulic Hack Saw
No. 18 (Capacity 18"x18")

ARMSTRONG-BLUM MFG. CO. *"The Hack Saw People"*
5749 Bloomingdale Ave., Chicago, U. S. A. Eastern Sales: 199 Lafayette St., N. Y.



Grinding wheels are essential throughout all industry. On countless grinding jobs Macklin meets all demands for grinding wheels suitable in grain, grade, structure, size and shape for every grinding purpose. Macklin wheels cut cool and fast, hold their shape, and give long life.

An experienced Macklin Sales Engineer will be glad to assist you, without obligation, in the selection of the correct wheel to give most efficient and economical results on any particular job.

When considering grinding wheels why not "Protect Your Production" by specifying Macklin Grinding Wheels to insure uniform quality and dependable service?

MACKLIN COMPANY

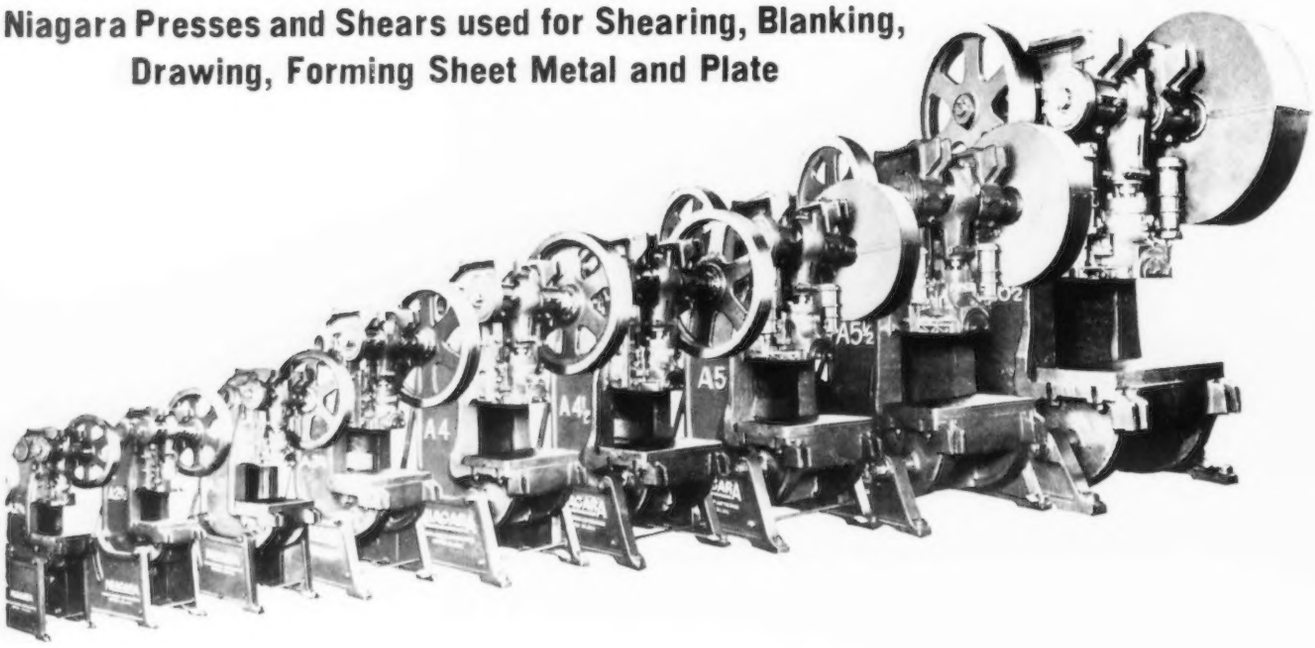
Manufacturers of Grinding Wheels—Jackson, Michigan, U.S.A.

DISTRIBUTORS IN PRINCIPAL CITIES

SALES OFFICES:—CHICAGO, NEW YORK, DETROIT, PITTSBURGH, CLEVELAND, CINCINNATI, MILWAUKEE, PHILADELPHIA.

MACKLIN

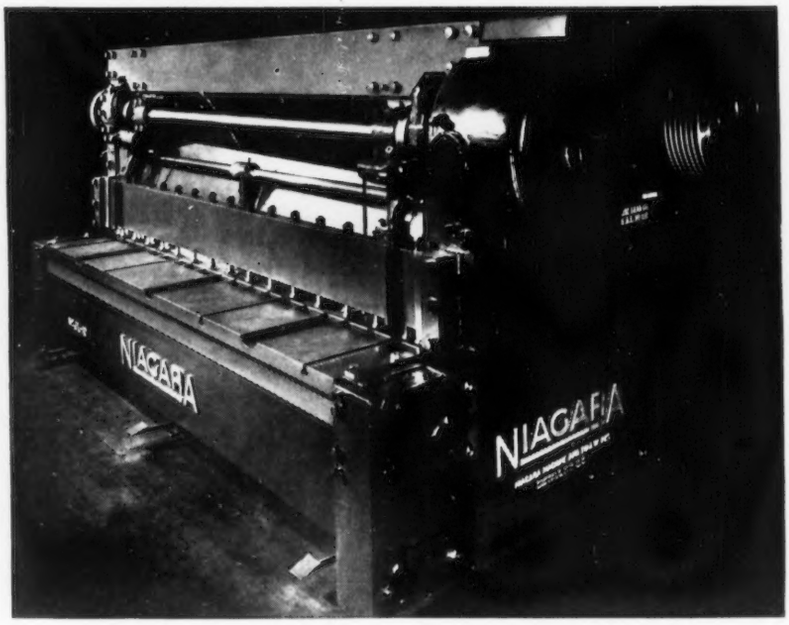
Niagara Presses and Shears used for Shearing, Blanking, Drawing, Forming Sheet Metal and Plate



IMMEDIATE
DELIVERIES
FROM STOCK

This line-up of Niagara Master Series "A" Inclinable Presses shows how the complete, well-graduated range of sizes offers the correct machine to fit every job. Advanced engineering features include strong rigid frames, instant acting 14-point engagement sleeve clutch with built-in single stroke mechanism, slides operate in multiple "V" gibs for accuracy and long die life, breech block die clamp, easily operated one-man inclining device. Write for Bulletin 58-G.

Features of latest type Niagara Power Squaring Shears include accurate, flat cutting . . . enclosed drive with anti-friction bearing mounted gears and clutch running in oiltight case . . . 14-point sleeve clutch with built-in single stroke mechanism for instant engagement and more working strokes per hour . . . positive clutch lock . . . triangular section crosshead . . . box section bed . . . smooth acting, toggle operated holddown with individual cushioned feet to compensate for varying thicknesses of sheets . . . self-measuring, ball bearing, parallel back gage measuring in increments of 1/128 inch for ease and micrometer accuracy of adjustment.

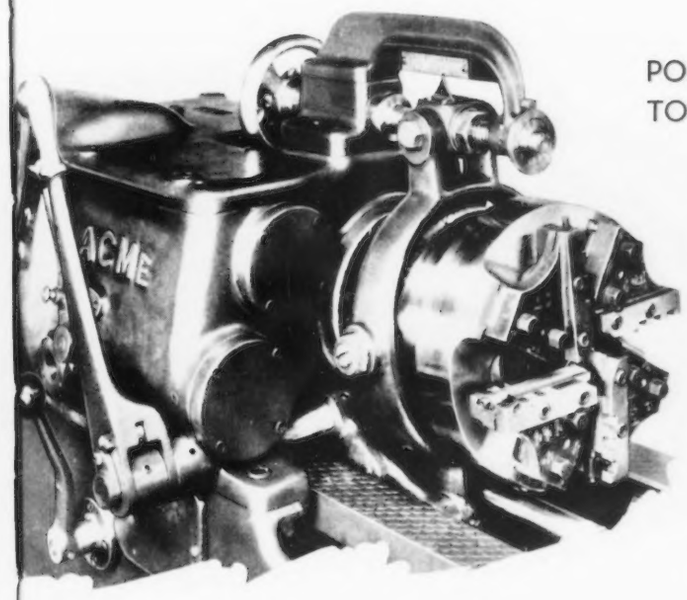


NIAGARA MACHINE AND TOOL WORKS, BUFFALO, N. Y., U. S. A.

BRANCHES: General Motors Bldg., DETROIT Leader Bldg., CLEVELAND. 50 Church St., NEW YORK

ACME "XL" THREADING MACHINES

HAVE A RUGGED ALL-GEARED DRIVE



● Simplicity and ruggedness of design has been a characteristic of ACME machinery for half a century, and it is characteristic of the new ACME XL Threading Machines today. It is seen in the provision for eight speed changes in virtually geometric progression in the self-contained, quick-change, selective-type gear train shown above. Wide faced, large diameter gears insure minimum tooth pressure. All gears are made of chrome nickel steel, accurately machined and heat treated, and are carried on chrome nickel steel shafts, heat treated and ground. Gears and shafts are mounted on pre-loaded tapered roller bearings, splash lubricated. Friction clutch control is mounted outside of headstock with multiple V-belt drive from motor in base to main pulley. Only three shafts and ten gears are used in the gear train of the ACME XL single threading machine, also available in double, triple and quadruple head models, in 1", 1½" and 2" sizes. *ACME XL Threading Machines with the new* Micrometer Adjustment *and the ACME Tangent Die Head* (patented) *will make production records in your shop. Ask for particulars.*

THE ACME MACHINERY COMPANY

Established 1882

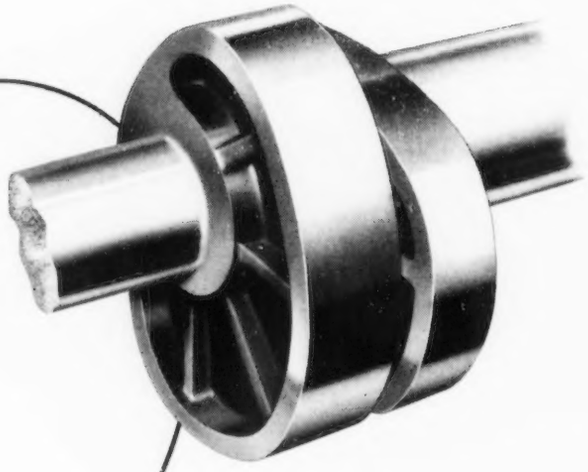
4535 ST. CLAIR AVENUE

FORGING • THREADING • TAPPING

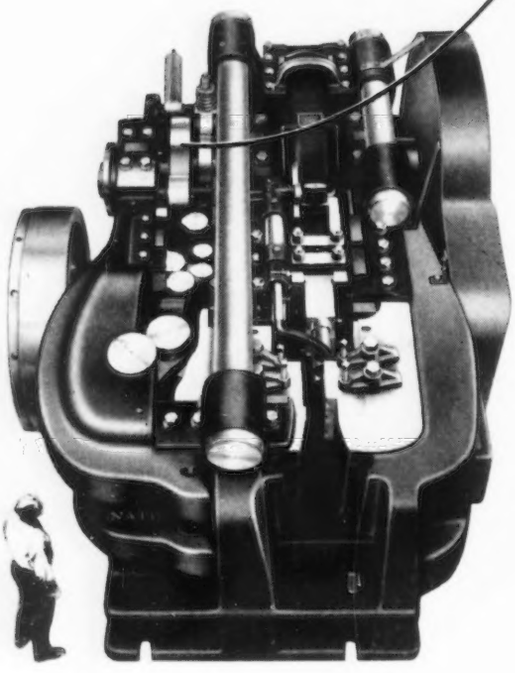
BOLT • NUT • RIVET MACHINES

Cleveland, Ohio

SINCE 1911



DOUBLE GRIPPING CAMS



ORIGINATED by National more than a quarter of a century ago, this double gripping cam is just as essential to the ultra modern forging machine as the day it was invented.

It is simple, rugged, powerful and positive. It gives the essentials in forging machine grip and holding range which enables the modern forging machine to produce its almost unlimited variety of accurate forgings.

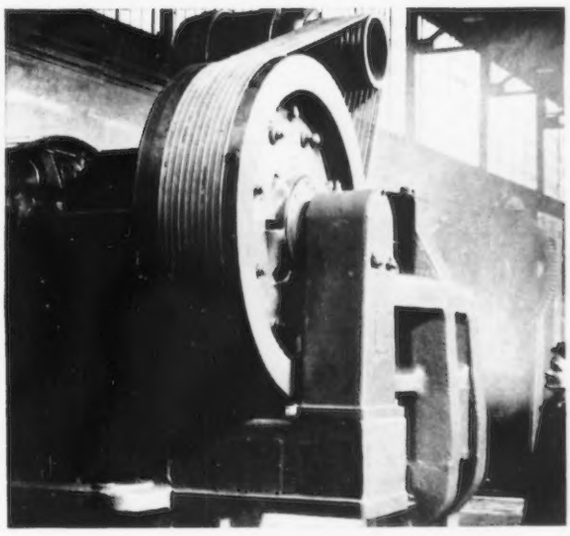
NATIONAL
MACHINERY COMPANY
TIFFIN, OHIO.

New York Detroit Chicago

THE AIR CLUTCH ON THIS NEW AJAX FORGING MACHINE MAKES WORK A PLEASURE
YES! AND GIVES US 25% MORE PRODUCTION THAN WE EVER GOT BEFORE
AJAX

AJAX
AIR CLUTCH FORGING MACHINES

Give Higher Production with Less Operator Effort



AJAX DOUBLE DRAFT VENTILATED AIR CLUTCH

• The greatly increased production of AJAX Forging Machines is directly due to the instantaneous treadle response of the air clutch originated by AJAX. • Force ventilated from hub to rim on both sides, the heat of clutch engagement is dissipated at a rate which challenges the highest frequency of operation.

• The smooth, cushioned starting at high speeds and instant response to effortless tripping make possible increased production on all forgings and the completion of many multi-operation forgings at a single heat which would otherwise require reheating.

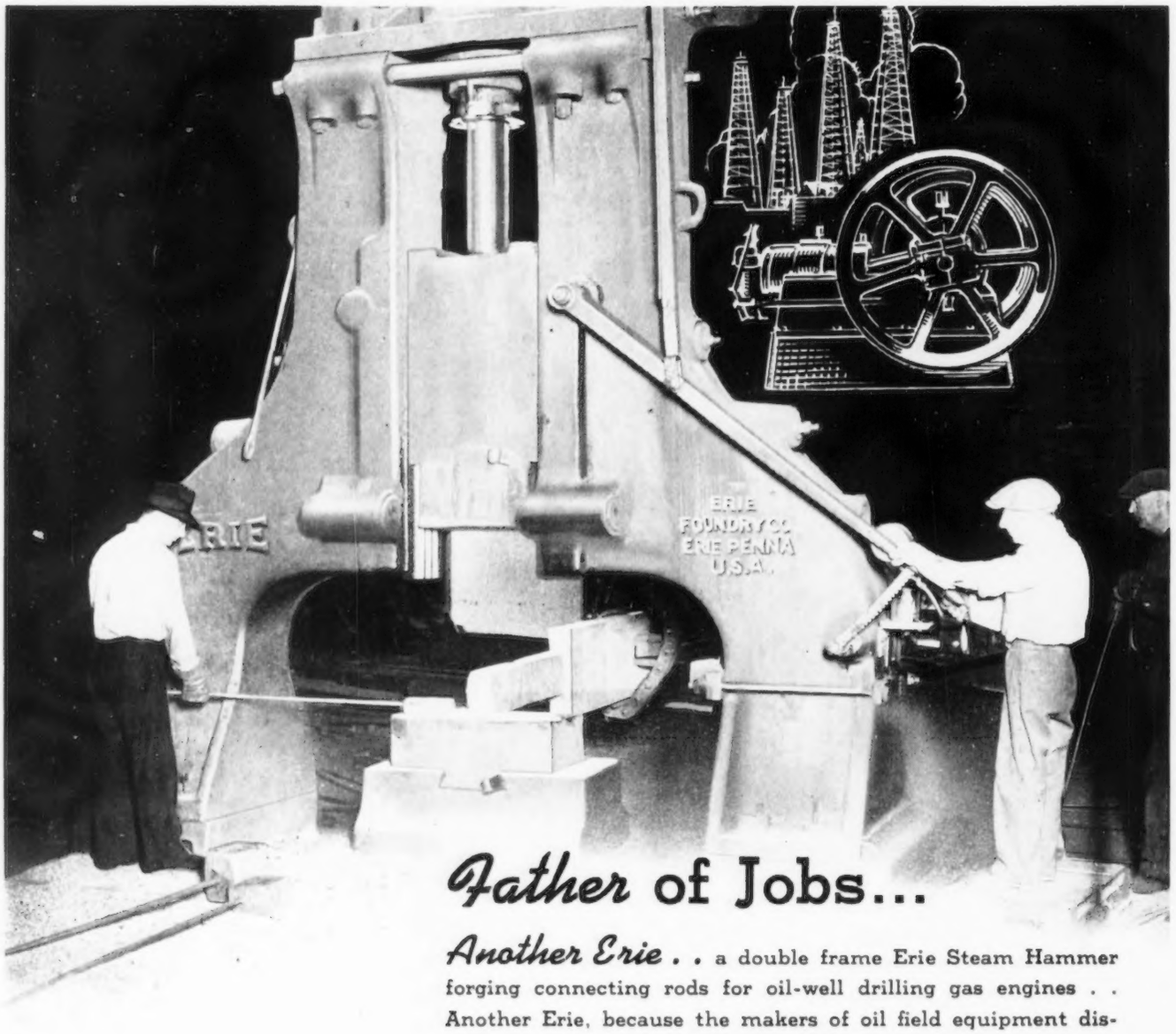
Write for Bulletin No. 65-A

THE AJAX MANUFACTURING COMPANY

621 Marquette Bldg.
Chicago, Ill.

EUCLID BRANCH P. O.
CLEVELAND, OHIO

201 Dewart Bldg.
New London, Conn.



Father of Jobs...

Another Erie . . a double frame Erie Steam Hammer forging connecting rods for oil-well drilling gas engines . . Another Erie, because the makers of oil field equipment discovered long ago that Erie Hammer design and construction bring lower cost to forge shop operation . . make better forgings . . Another Erie . . Father of Jobs . . making sturdy forgings vital to other time-saving machines . . enabling men of industry to produce more . . to earn more . . Erie has built job-making hammers for over 36 years . . creating more work in every industry where forgings are used. Your copy of Bulletin 330 on Erie Double Frame Forging Hammers is ready for you now.

Time-Saving Machines made this Hammer.
Making this Hammer made many Jobs for Men.

ERIE

ERIE FOUNDRY CO.

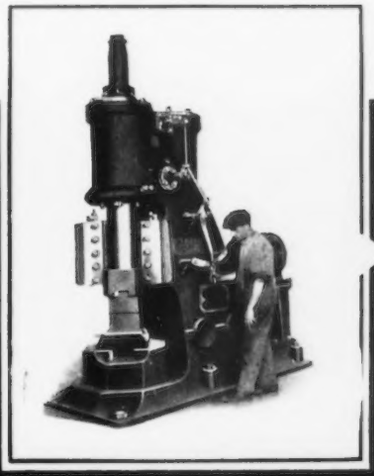
ERIE, PENNSYLVANIA, U. S. A.

DETROIT — 335 Curtis Bldg.
CHICAGO — 549 Washington Blvd
INDIANAPOLIS — 335 Postal Station Bldg
FRANCE — Fenwick, S. A.
CANADA — John Bertram & Sons Co., Ltd.
ENGLAND — Burton, Griffiths & Co., Ltd.

ERIE BUILDS *Dependable* HAMMERS

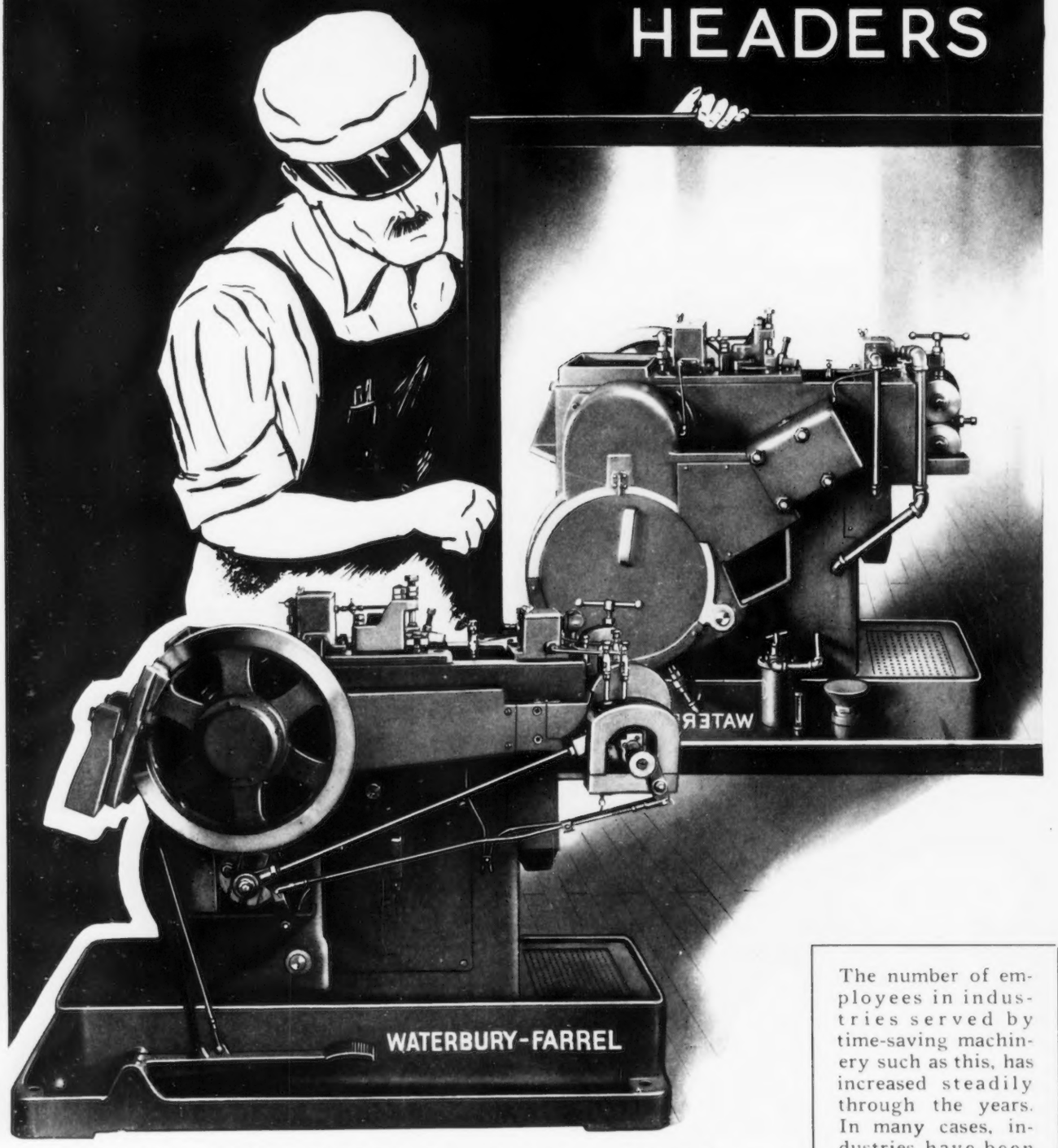
Off a New Assembly Line . . .

Taking over the entire business of the Nazel Engineering & Machine Works, a new division of a hundred-and-four year old company offers vastly increased facilities for production and service on internationally famous Nazel Motor-Driven, Air Actuated Forging Hammers . . .



NAZEL FORGING HAMMERS NOW ARE PRODUCED, SOLD AND SERVICED BY THE NAZEL HAMMER DIVISION OF THE LOBDELL CAR WHEEL CO. AT WILMINGTON, DEL.

WATERBURY FARREL • HI-PRO HEADERS



SOLID DIE DOUBLE STROKE—For cold-heading rivet and screw blanks—Designed to meet present day demands for speed, mass production and economy—Two standard sizes: 3 16″ by 1″ at 225 per minute; 5 16″ by 1½″ at 175 per minute.

The number of employees in industries served by time-saving machinery such as this, has increased steadily through the years. In many cases, industries have been nurtured to robust health by time-saving machinery.

WATERBURY FARREL FOUNDRY AND MACHINE COMPANY

WATERBURY, CONNECTICUT

CLEVELAND CHICAGO NEWARK, N. J.

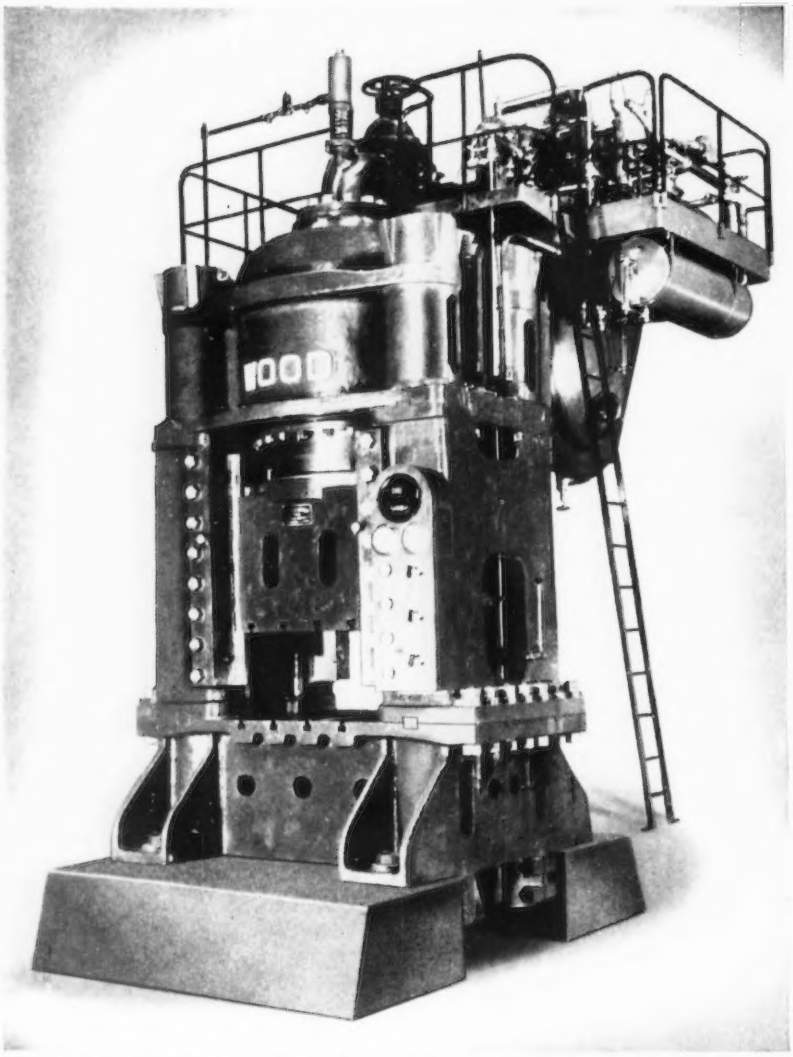
You can PRESS at a PROFIT The Southwark Way

Southwark Hydraulic Presses have proven themselves in metal working plants the country over. They have increased production up to 70%, have lengthened die life as much as four times, have reduced rejects and repressings to a minimum.

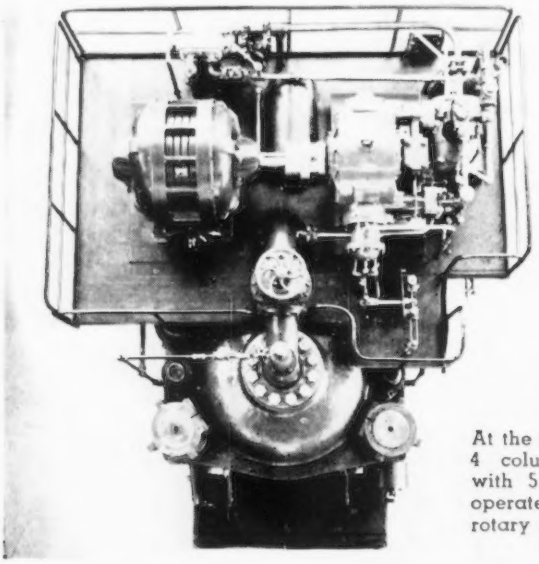
Southwark has built a complete line of self-contained hydraulic presses for every phase of metal forming. Soundly engineered, carefully built, Southwark Hydraulic Presses can help you do a better job—more economically.

Baldwin-Southwark Corporation, Southwark Division, Philadelphia; Pacific Coast Representative, The Pelton Water Wheel Company, San Francisco.

SOUTHWARK *Hydraulic* PRESSES



Above is shown a 2000 ton, high speed HydroLectric press. The gib-guided crosshead ensures great accuracy. The unusual view below shows the well-planned accessibility of the motor-driven pump and other operating units on the top of this same press.



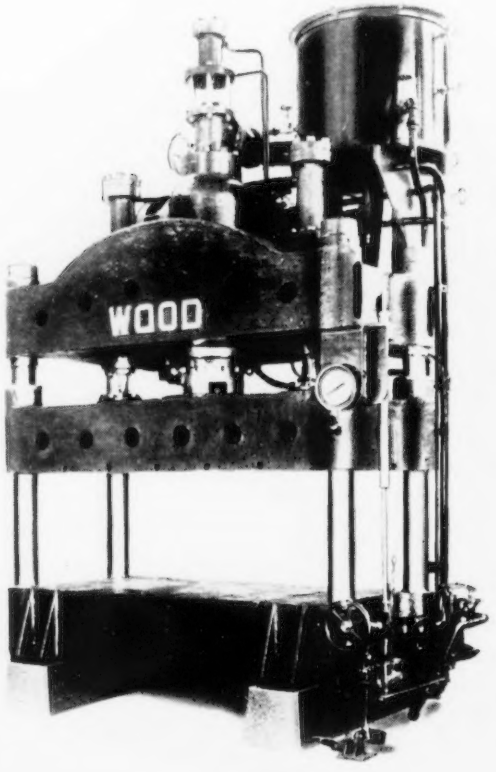
At the right is a 350 ton, 3 ram, 4 column HydroLectric press with 53" x 96" platens. It is operated by a variable pressure rotary piston pump

HYDRAULIC PRESSES

for the AIRCRAFT industry

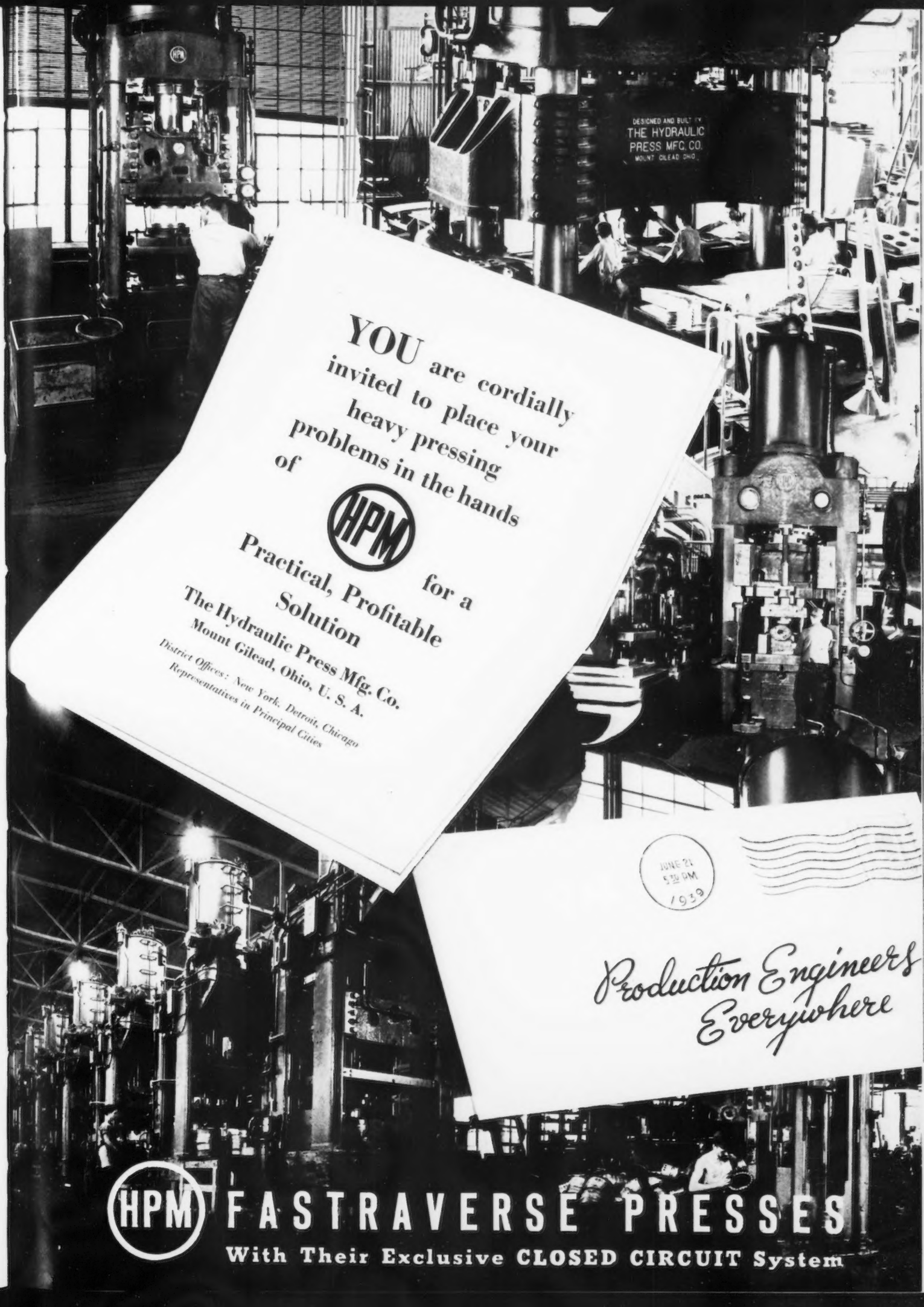
A broad range of industries have used Wood hydraulic presses for more than half a century. The adaptability, accuracy and accessibility for servicing that characterize Wood equipment, as well as economy and ease of operation, have become synonymous with the Wood name.

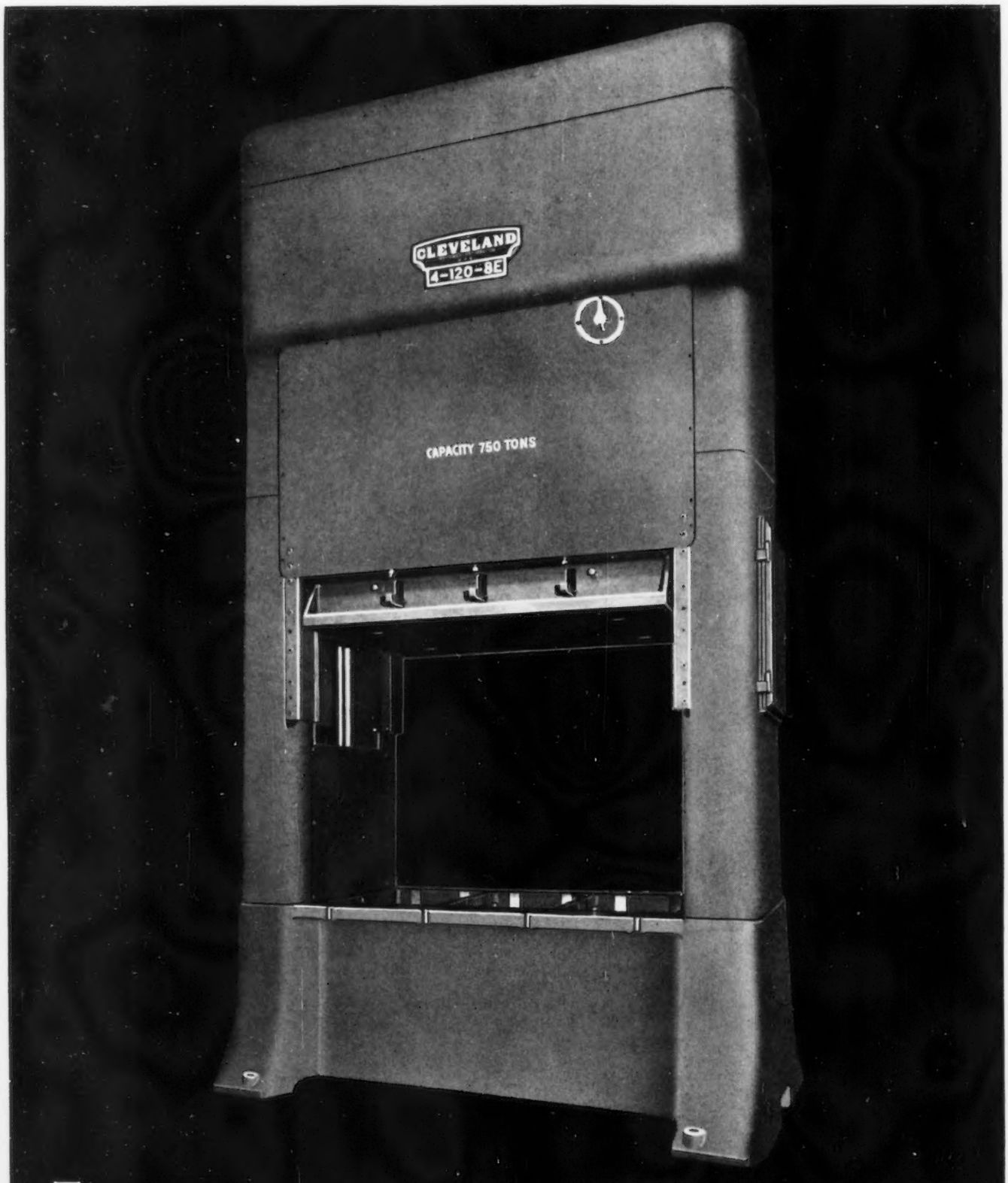
It is but natural that the rapidly expanding aircraft industry, with its unusually high manufacturing standards, turns to the Wood Company for dependable hydraulic presses and equipment.



ESTABLISHED 1803 **R. D. WOOD CO.** PHILADELPHIA, PA.

HYDRAULIC PRESSES and VALVES for EVERY PURPOSE


DESIGNED AND BUILT BY
THE HYDRAULIC
PRESS MFG. CO.
MOUNT GILEAD OHIO
YOU are cordially invited to place your heavy pressing problems in the hands of
HPM
for a Practical, Profitable Solution
The Hydraulic Press Mfg. Co.
Mount Gilead, Ohio, U. S. A.
District Offices: New York, Detroit, Chicago
Representatives in Principal Cities
JUNE 21
1939
Production Engineers Everywhere
HPM
FASTRAVERSE PRESSES
With Their Exclusive CLOSED CIRCUIT System



THIS neat, compact and highly efficient MODERN Cleveland Four Point Press, which is symmetrical front and rear, operates in a continuous production line, exerts a pressure of 750 tons and is so designed that the clutch, brake, gearing and all moving members are EASILY ACCESSIBLE.

THE CLEVELAND PUNCH & SHEAR WORKS COMPANY, CLEVELAND, OHIO

"THE COMPLETE LINE—COMPLETELY MODERN"

What Users Say about this NEW-TYPE QUILL BEARING

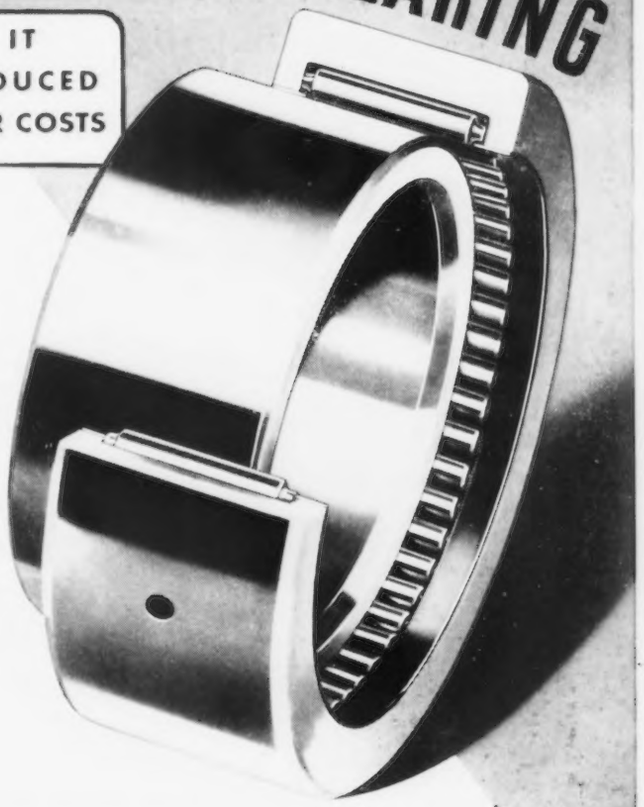
IT REDUCED OUR COSTS

IT CARRIES HEAVIER LOADS

IT TAKES LESS SPACE

IT'S EASIER TO ASSEMBLE

IT'S FAR MORE DEPENDABLE



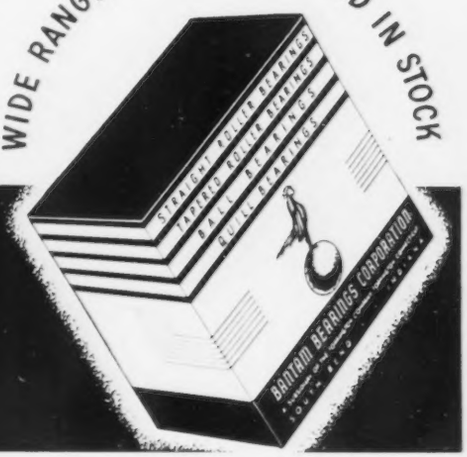
BANTAM'S new-type Standard Series Quill Bearings have scored a phenomenal *sales success* based solely on *operating success*. In a wide range of industries they have proved their ability to solve bearing problems of long standing. Repeat orders prove the satisfaction of users who write us enthusiastically about savings in cost and improvements in performance.

This new type Quill Bearing is built to the same high quality standards as the Bantam Quill Bearings used on Diesel-powered streamline trains. The design is greatly simplified. There are no fragile parts—no possibility of failure. New method of roller retainment provides for quick, easy assembly. End thrust is taken on the ribs of the one-piece channel-shaped outer race. Correctly proportioned rollers with husky curvilinear trunnions insure longer service.

For complete engineering data, write us for Bulletin 103M. For Needle Bearings to be used in lighter service write our affiliate, The Torrington Company, Torrington, Conn., and ask for Circular 21A.

BANTAM BEARINGS CORPORATION
South Bend, Indiana
Subsidiary of THE TORRINGTON CO.
Torrington, Conn.

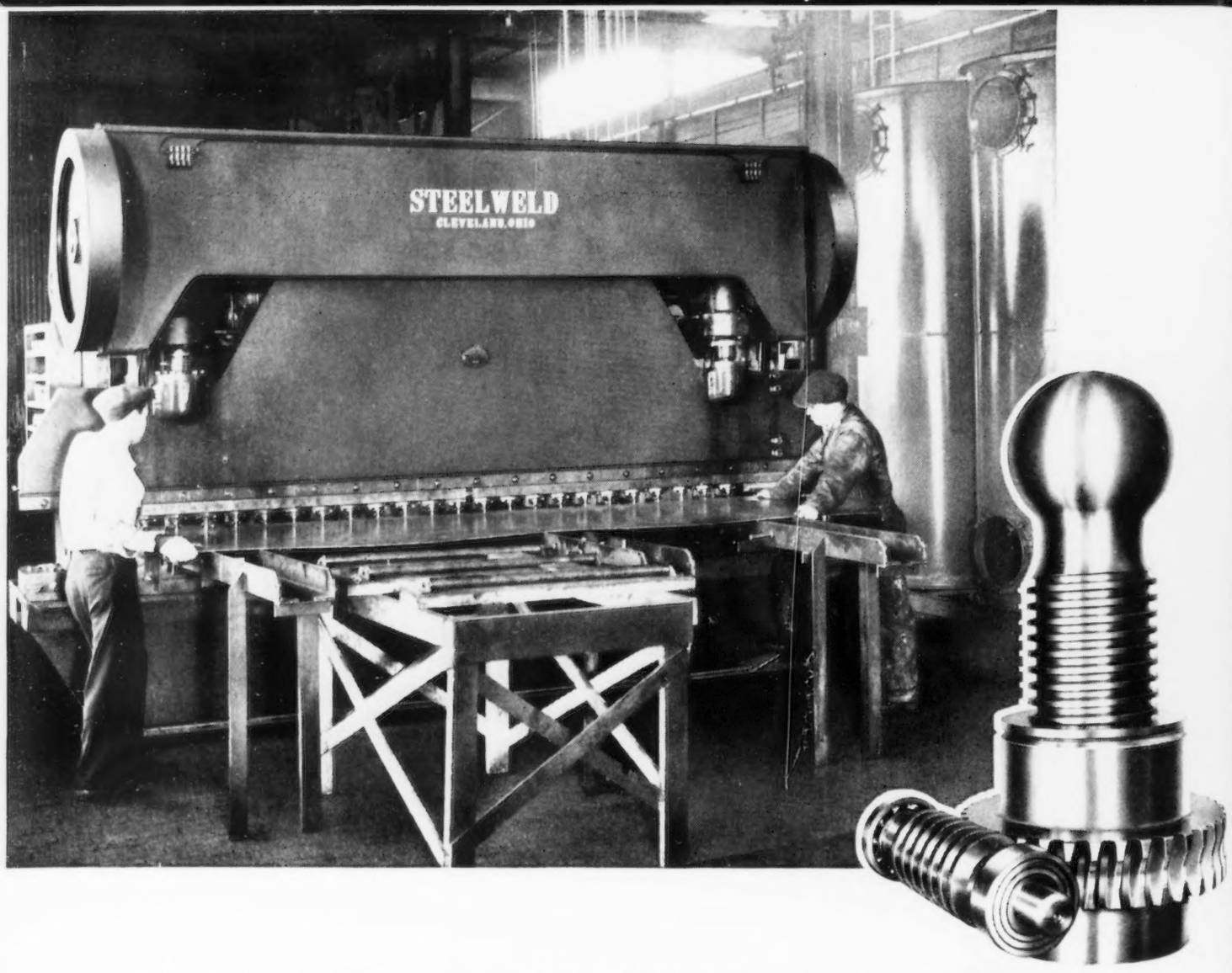
WIDE RANGE OF SIZES CARRIED IN STOCK



TAPERED ROLLER—STRAIGHT ROLLER—BALL

BANTAM BEARINGS

STEELWELD *Bending Presses*



Low costs are the Key to busy plants

This adaptable tool, cuts cost for bending, forming, blanking and multiple operation.

The Heat treated screws and ball mounted worm with highest grade revolving bronze nuts are insurance not only against wear but eliminate costly breakdowns with attendent loss of invaluable production time.

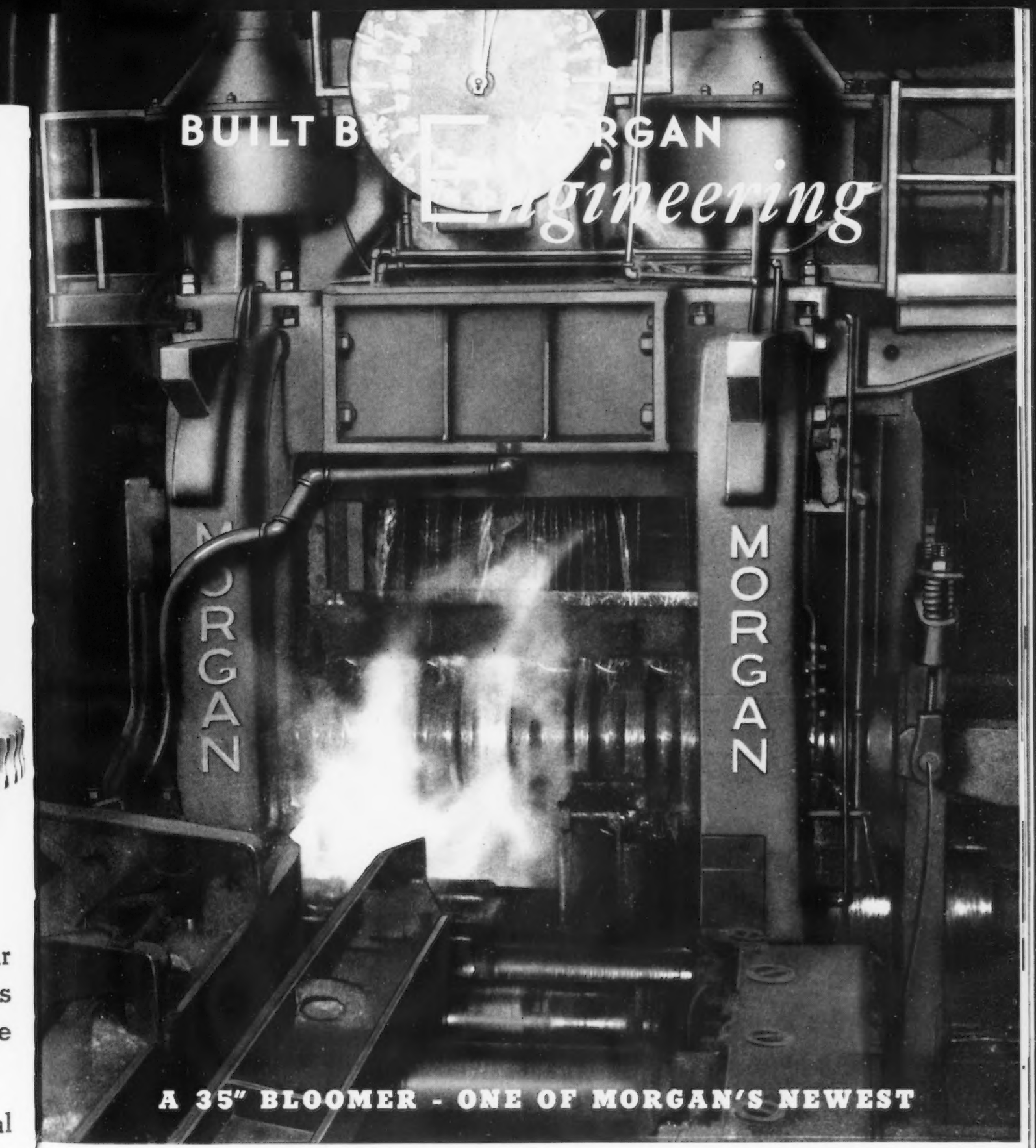
The adjusting mechanism is vital in a bending press.

THE CLEVELAND CRANE & ENGINEERING CO.

STEELWELD MACHINERY DIVISION

WICKLIFFE, OHIO.

CYRIL BATH & CO., GENERAL SALES AGENTS . . . . E. 70TH & MACHINERY AVE., CLEVELAND, OHIO



A 35" BLOOMER - ONE OF MORGAN'S NEWEST

• Among the many types of mill equipment built by Morgan is the above 35" two-high blooming mill complete with double manipulator, front and rear tables, recently installed in a prominent mid-west steel plant. A similar 35" mill and equipment are now under construction in our shops for another prominent mid-west producer. Housings are one-piece steel castings of the closed top type. Top roll balance is of the counterweight type. Manipulator is of the overhead type, compact and accessible. Tables are of heavy design, equipped with anti-friction bearings. Provision is made for automatic lubrication and exclusion of scale and dirt.

★

DESIGNERS • MANUFACTURERS • CONTRACTORS

BLOOMING MILLS • PLATE MILLS • STRUCTURAL MILLS

★ ELECTRIC TRAVELING CRANES • CHARGING MACHINES

INGOT STRIPPING MACHINES • SOAKING PIT CRANES

★ ELECTRIC WELDED FABRICATION • LADLE CRANES

STEAM HAMMERS • STEAM HYDRAULIC FORGING

★ PRESSES • SPECIAL MACHINERY FOR STEEL MILLS

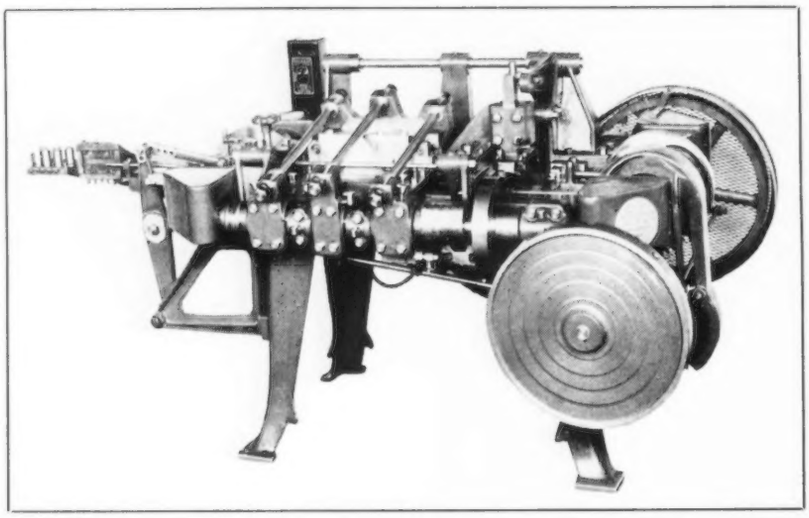
THE MORGAN ENGINEERING CO., Alliance, Ohio

Pittsburgh, 1420 Oliver Building

★

NILSON WIRE AND METAL RIBBON FORMING MACHINES

Help Put Inventions To Work



Inventions create new industries and new jobs, but it takes time-saving machinery to get the inventions off the shelf and into production.

We build machines that save time in forming buckles, gate hooks, coat and hat hooks, ceiling hooks, paper clips, wire ears, screw eyes, cable rings, sash chains, flat open link chains, staples, cotter pins, hose clamps, etc.

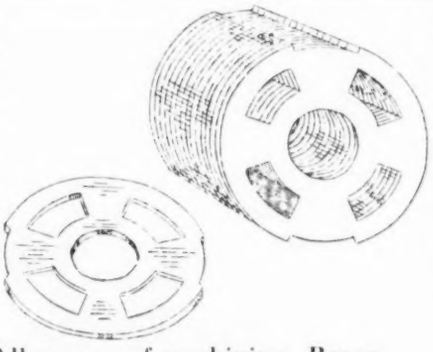
Also Wire Straighteners, Wire Reels, Frame Bending Machines and Special Presses.

THE A. H. NILSON MACHINE CO.

BRIDGEPORT, CONN., U. S. A.

16 PIECES AT ONCE

The first job a Hartford manufacturer cut on their new DoAll. 16 pieces at the same time, each 3/16" thick; outer diameter of plates 8". Accuracy .003 top to bottom, using disc cutting attachment. No other method will turn out such accurate work and *Save 30 Hours Doing It.*



Meet Today's Challenge for *Greater Speed*

★ DO-ALL Contour Machine BAND SAWING BAND FILING BAND POLISHING ★

FREE—New Hand Book on Contour Machining—100 pages of valuable metal working helps.

Contour Sawing is the new DoAll process of machining. Recognized as the fastest precision method of removing metal: cuts out internal and external shapes from any metal up to 10" thick.

Does work of 3 machines. DoAll is a moderately priced, rugged, precision machine tool that replaces shaping, milling and lathe work on a large variety of jobs with enormous savings.

Used in large and small plants in 30 countries, by such firms as Ford, Fisher Body, Cadillac, Baldwin Locomotive, Douglas Aircraft, U. S. Navy, International Harvester, General Electric, Westinghouse, Ace Tool & Die, Glenn L. Martin, etc.

Let a factory trained man bring a DoAll to your plant and show you what it does, what it saves on your own work.

CONTINENTAL MACHINES, INC.

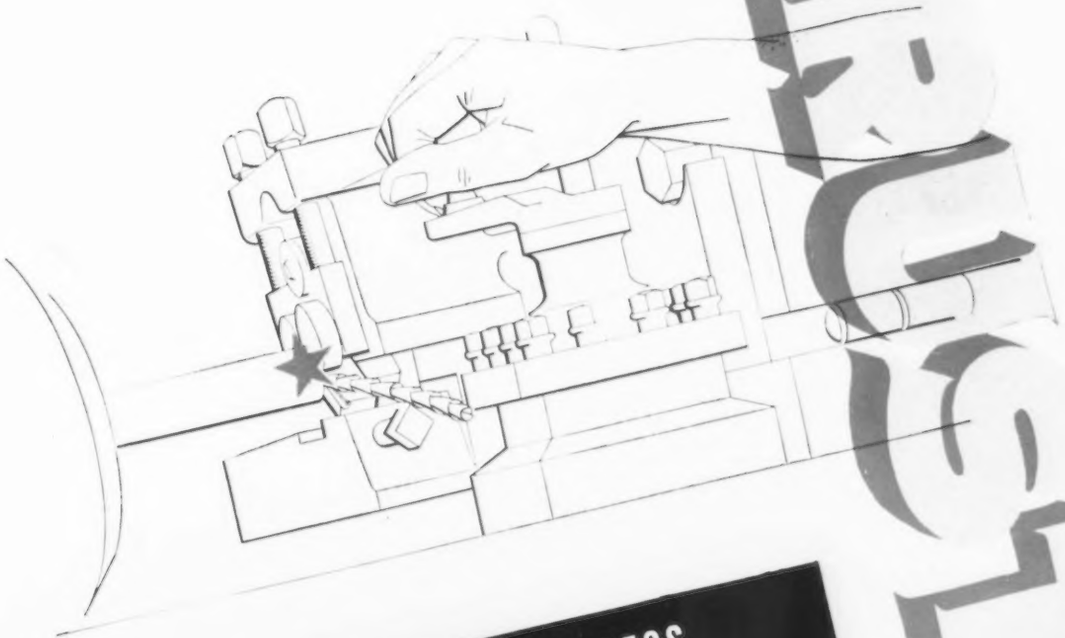
1311 S. Washington Ave. Minneapolis, Minn.

☐ Send data on the DoAll. ☐ Send Free Hand Book. IA-7

NAME .....

ADDRESS .....

PRODUCED BY AN ORGANIZATION MAKING STAINLESS STEELS EXCLUSIVELY



RUSTLESS

FULL TIME ON STAINLESS PAYS OUT HERE ★ FOR YOU

Because Rustless makes nothing but stainless steel, users enjoy three important benefits.

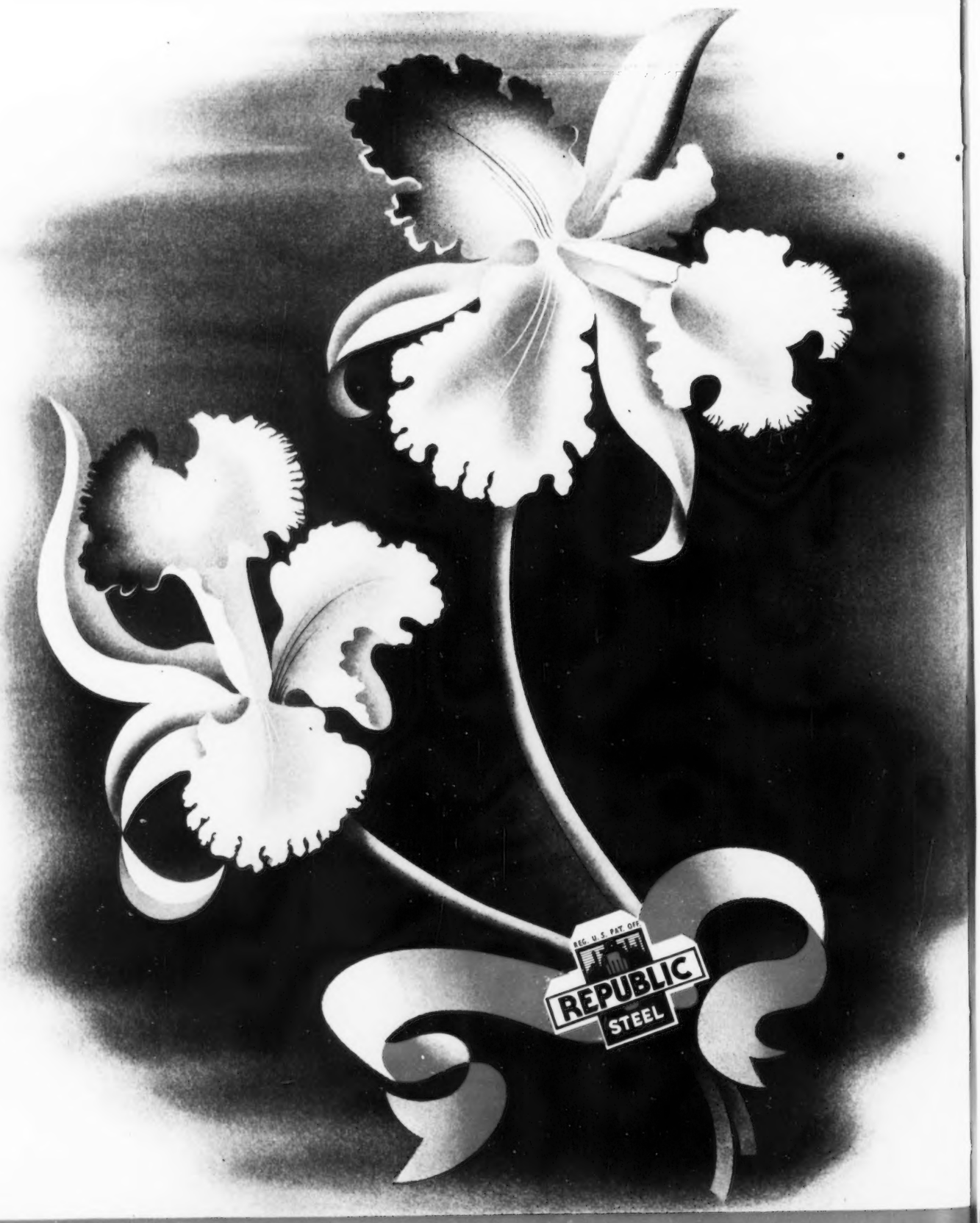
With no conflicting interests to distract men or machines from their one job, Rustless can make prompt deliveries on large or small orders . . . can conform to the highest quality standards . . . can maintain the order-to-order uniformity so essential to maximum production profit in your shop.

May we illustrate how these advantages can pay out for you?

RUSTLESS IRON AND STEEL CORPORATION · BALTIMORE · MD.
Producing Stainless Steels Exclusively

RUSTLESS
STAINLESS STEEL
BARS AND WIRE

SALES OFFICES · CHICAGO—4201 IRVING PARK ROAD · **CLEVELAND**—731 SOCIETY FOR SAVINGS BUILDING · **DETROIT**—4-137 GENERAL MOTORS BUILDING · **PHILADELPHIA**—1263 COMMERCIAL TRUST BUILDING · **DISTRIBUTORS IN PRINCIPAL CITIES**



REPUBLIC SHEETS

HOT AND COLD

. . . to the products of

REPUBLIC'S WIDE STRIP MILL

A manufacturer of grave vaults using wide sheets wrote—"Permit me to compliment you on the material recently furnished us. In every respect your material is just a little better than that others have been able to furnish."

A maker of switchboards using various types of hot and cold rolled strip which is stamped, formed, punched and welded told us—"There has been a noticeable improvement in quality since the material we get from Republic is being rolled on the 98-inch mill."

The foreman of a plant manufacturing railroad cars and a heavy user of hot rolled sheets of various sizes stated—"This is the finest material that ever came into our plant. It was beautifully packaged, the surface was excellent, the sheets were flat and they fabricated and formed perfectly."

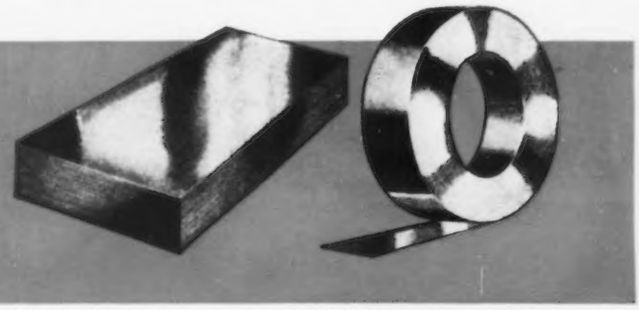
A fabricator of heavy hot rolled, mill run cold rolled and stretcher leveled cold rolled sheets recently wrote—"We are pleased to let you know that these sheets are the best we have received and are praised by our men. We want you to know this, for oftentimes folks are apt to complain rather than to praise."

Coming from users of so many products, these comments prove that you do not have to be a user of maximum width sheets to take advantage, in your plant, of the orchid-earning qualities rolled into all the products of the Republic Wide Continuous Mill. An order will prove it.

REPUBLIC STEEL CORPORATION · GENERAL OFFICES: CLEVELAND, OHIO

UNION DRAWN STEEL DIVISION • TRUSCON STEEL COMPANY
BERGER MANUFACTURING DIVISION • STEEL AND TUBES, INC.
NILES STEEL PRODUCTS DIVISION

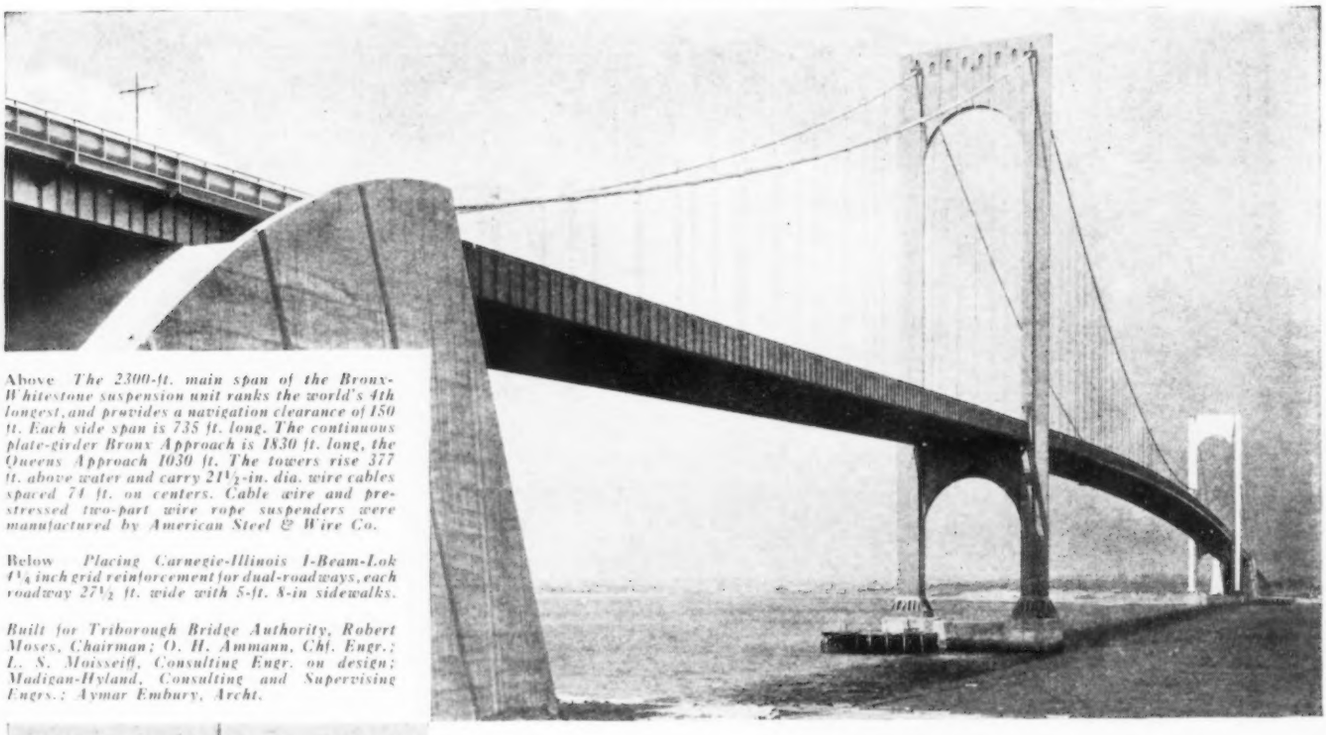
S AND STRIP
D ROLLED



COMPLETED!

World's 4th Longest Suspended Span

—The Bronx-Whitestone Bridge



Above *The 2300-ft. main span of the Bronx-Whitestone suspension unit ranks the world's 4th longest, and provides a navigation clearance of 150 ft. Each side span is 735 ft. long. The continuous plate-girder Bronx Approach is 1830 ft. long, the Queens Approach 1030 ft. The towers rise 377 ft. above water and carry 21½-in. dia. wire cables spaced 74 ft. on centers. Cable wire and pre-stressed two-part wire rope suspenders were manufactured by American Steel & Wire Co.*

Below *Placing Carnegie-Illinois I-Beam-Lok 4¼ inch grid reinforcement for dual-roadways, each roadway 27½ ft. wide with 5-ft. 8-in sidewalks.*

Built for Triborough Bridge Authority, Robert Moses, Chairman; O. H. Ammann, Chf. Engr.; L. S. Moisseiff, Consulting Engr. on design; Madigan-Hyland, Consulting and Supervising Engrs.; Aymar Embury, Archt.

THE Bronx-Whitestone bridge, spanning the East River, is the key structure in a 5-mile express highway connecting the Hutchinson River Parkway with Long Island's high-speed traffic network. It constitutes one of the most important links in the Circumferential Parkway system which, eventually, will completely girdle New York City. For travelers between the New England states and the New York World's Fair on Long Island, it affords a traffic by-pass skirting New York City and saving a distance of some 8 miles.

The entire 1¼ mile bridge superstructure, ready for service even to the finished roadway and lighting system, was under contract to American Bridge Company. Geared to perhaps the fastest construction schedule ever attempted on a large-scale engineering project, the work was actually completed in 18 months — one month ahead of contractual obligations.

This construction performance offers striking evidence of the fact that, regardless of the size of the operation, when time is short and the utmost speed is essential to meet the exacting need of ON TIME fabrication and erection, you can count on American Bridge Company's facilities and personnel to adequately deliver.

AMERICAN BRIDGE COMPANY

General Offices: Frick Building, Pittsburgh, Pa.

Baltimore · Boston · Chicago · Cincinnati · Cleveland · Denver · Detroit · Duluth · Minneapolis · New York · Philadelphia · St. Louis

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

THEY GO 'ROUND AND 'ROUND TOGETHER!

There's No Sag, No Slip, No Uneven Wearing When You Use MATCHED SETS of Allis-Chalmers Texrope V-Belts! Read How They Can Help You Cut Your Power Transmission and Maintenance Costs!

NEW MEASURING MACHINE SHOWS EXACT length of belt to 1/100th of an inch . . . permits matching of belts into sets that carry the load TOGETHER!

There's a special reason why Allis-Chalmers Texrope V-Belts do their share of work equally, carrying the load TOGETHER! It's because they are sold in *matched sets!*

And matching Texrope belts is more than just taking units from the same mould or production run. Now — with a newly developed measuring machine — every belt is tested in a grooved sheave running under normal operating tension . . . and the exact length to 1/100 of an inch is registered on a finely calibrated meter.

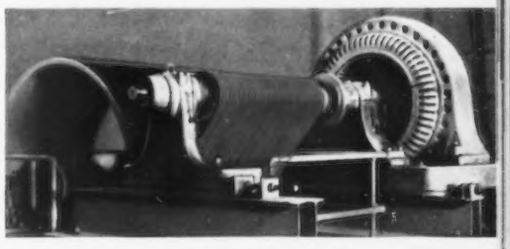
That's the kind of accuracy you want in the belts you buy for your plant. It means long, even wearing . . . and a transmission efficiency up to 98.9%!

Originally developed by Allis-Chalmers, Texrope multiple V-Belts are everywhere helping plant operators to cut costs. With these drives, there is no slipping . . . no jerking . . . no roar or hum. Production is made steady . . . maintenance costs on motors and drives are sharply reduced!

Cut Costs With Texropes!

Get in stride with the times . . . follow the lead of others who every day are cutting costs with Texropes. Learn how you can save in your plant with long-wearing Texrope Drives in *matched sets!*

There's a trained engineer in the district office near you who is backed by Allis-Chalmers 90 years of experience. He'll be glad to explain Texrope features . . . to show you how you can cut your power transmission costs. Call him today. Or write direct to Allis-Chalmers.



ALTHOUGH DRIVEN BY A 90 RPM diesel engine with extremely severe power impulses, the thirty six belts on this generator act as a unit, sharing the load equally . . . because they are matched as a set!

Vari-Pitch Speed Changers • Texrope V-Belts • Duro-Bronze Texsteel Sheaves • Vari-Pitch Sheaves • Standard Cast Iron Sheaves • Adjustable Pitch Diameter Texsteel Sheaves • 2-3-4 Combination Sheaves • Straight-line Automatic Motor Bases • Oil Field Drilling Rigs

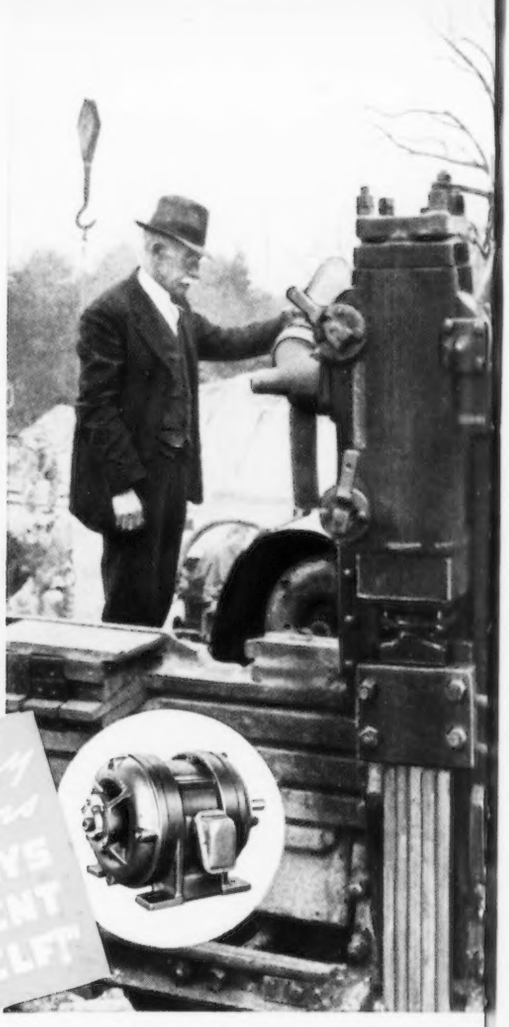
Belts by Goodrich

TEXROPE DIVISION

ALLIS-CHALMERS

MILWAUKEE · WISCONSIN

THIS JOB "KILLED" MOTORS!



A. W. HAMILTON, CHIEF ELECTRIcian of Alberene Stone Corporation, inspects the Lo-Maintenance Motor on one of his channeling machines. Insert shows a closeup of the Lo-Maintenance Motor that stayed on the job under conditions that "killed" other motors.

Another true case history from the Allis-Chalmers files that proves "IT PAYS TO BUY THE EQUIPMENT THAT PAYS FOR ITSELF"

Lo-Maintenance Motors Set Impressive Performance Record on Job that Wrecked Ordinary Motors! Find Out How Full Measure Construction in Lo-Maintenance Motors Means "Full Time" on the Job with No Frequent Time-Outs for Repairs!

"The Motor-Killing Job"—that's what they called it at the Alberene Stone Corp., Virginia! And they weren't far wrong! For the motors on their machines that channeled serpentine stone took a terrific pounding. When the cutter bar didn't go all the way down smoothly, the whole carriage on the machine was lifted . . . then dropped back with a thud!

Ordinary motors couldn't take it! Coils loosened and failed . . . bearings went to pieces under the continual punishment!

In 1936, A. W. Hamilton, Chief Electrician, and J. S. Graves, President, decided to try one Lo-Maintenance Motor . . . as an experiment. Then they waited for what they were afraid would happen. But it never did! That Lo-Maintenance Motor took the job in its stride . . . didn't break down . . . didn't need time out for repairs!

Better Service . . . Bigger Savings!

No wonder that now every channeling machine at the Alberene Stone Corporation is equipped with a Lo-Maintenance Motor! No wonder Mr. Hamilton says, "Because our channeling machines are often operating in very inaccessible locations, the Allis-Chalmers Motors, by eliminating the necessity for frequently changing motors, have given us many extra productive machine and man hours!"

When you install a Lo-Maintenance Motor, you get more than just a rated horsepower . . . more in service . . . more in dollars and cents savings. And there's no skimping on materials . . . for Lo-Maintenance construction is husky, full measure construction!

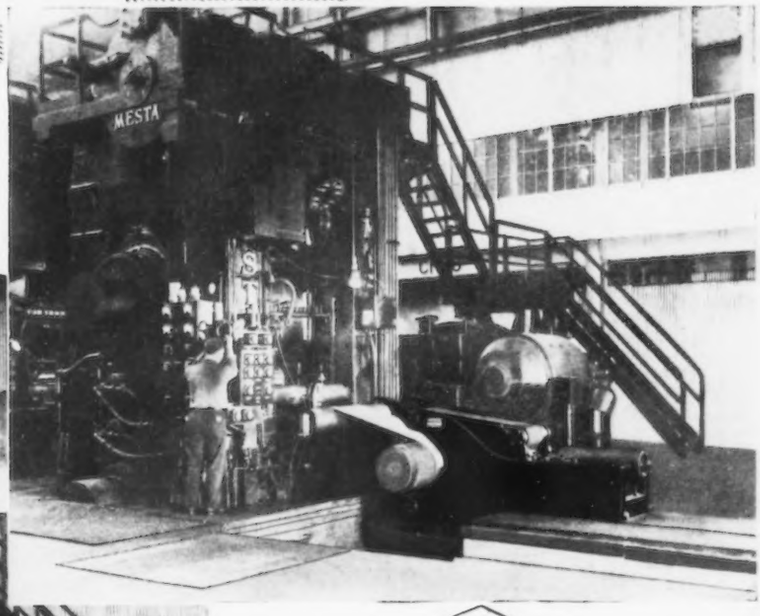
High carbon steel frame . . . indestructible rotor and distortionless stator . . . and Allis-Chalmers 90 years of advancing with industry — all these are plus features . . . plus features that make Lo-Maintenance Motors stand up for years under conditions that many times wreck ordinary motors.

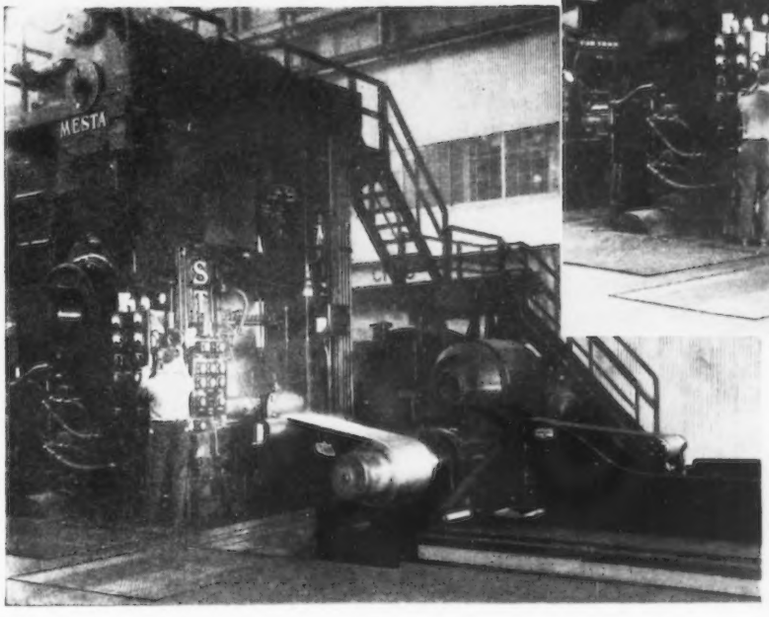
Learn the whole story of why industry is switching to Allis-Chalmers Lo-Maintenance Motors . . . how they can do a better job for you . . . at less cost! Call the nearest Allis-Chalmers district office, or write direct to Allis-Chalmers, Milwaukee, Wisconsin.

. . . 90 Years of Engineering Superiority Work for You When You Specify Allis-Chalmers!

ELECTRICAL DIVISION
ALLIS-CHALMERS
MILWAUKEE-WISCONSIN

MESTA
BELT WRAPPER





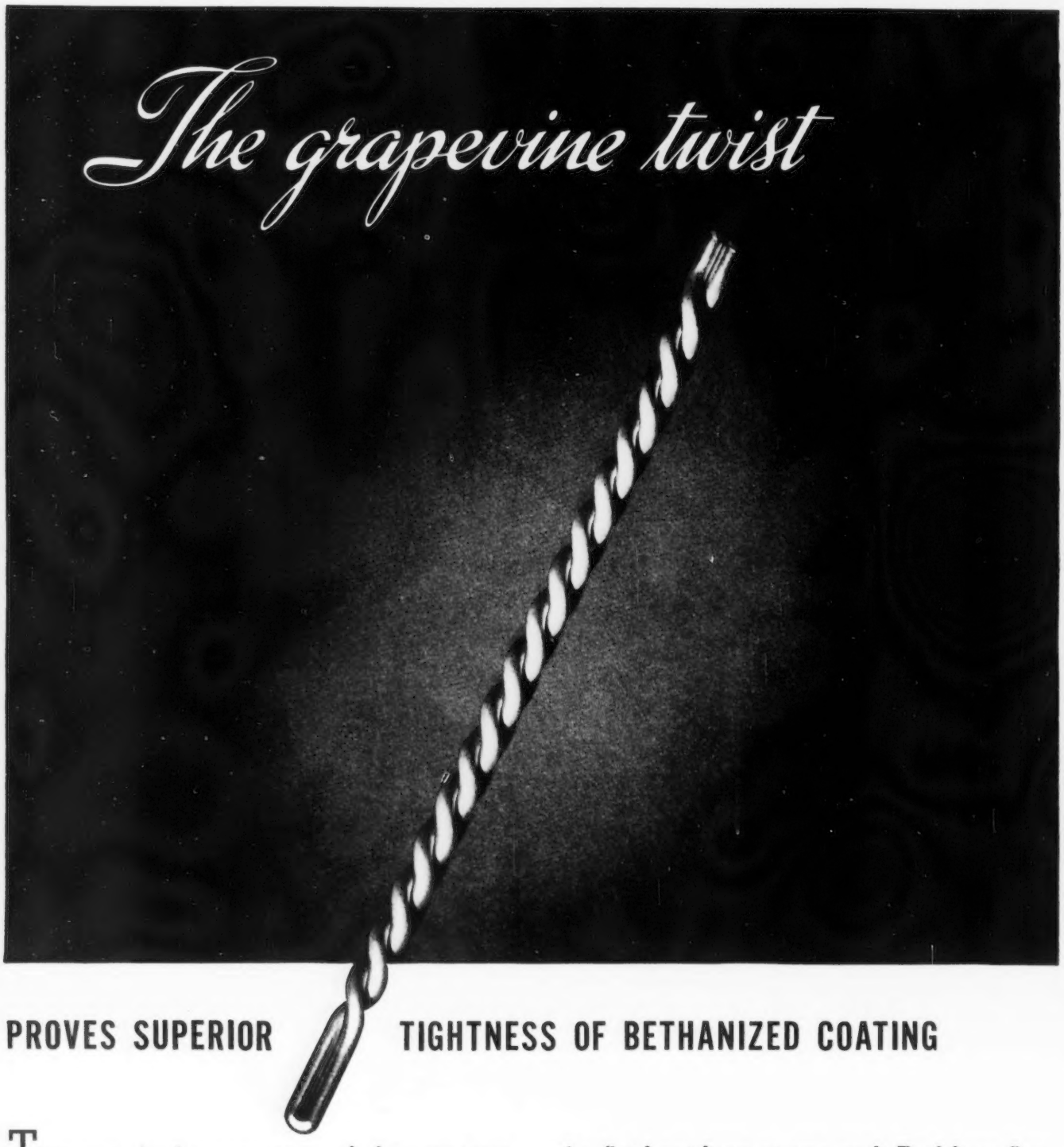
Belt wrapper in working position on 54" Four Stand Tandem Cold Mill at Jones & Laughlin Steel Corporation.

Belt wrapper in retracted position on same mill.

Mesta Belt Wrappers, for installation on Cold Mills, are built for hydraulic, air or motor operation.

MESTA MACHINE COMPANY · PITTSBURGH, PA.

The grapevine twist



PROVES SUPERIOR TIGHTNESS OF BETHANIZED COATING

THIS test duplicates some of the severest types of distortion encountered in wire fabrication. It is comprehensive proof of the superior tightness and ductility of the electrolytic bethanized coating.

A sample of bethanized wire twisted in this way is yours for the asking. Run your fingers over the close-wrapped grapevine twist, over the flat-bent loop at one end. Feel how flawlessly smooth these surfaces are. See the smooth unflaked texture of the zinc at the points where it has been most highly stressed.

This examination requires only a minute. Yet it gives you indisputable proof of the economy of fabricating with bethanized wire and of the high quality of products made from it.

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

FIRST CHOICE IN MANY GEAR CUTTING SHOPS

The steel used has to be good . . . the best, in fact . . . because the performance of the tool lies fundamentally in the steel. Tool Makers take no chances . . . they select steel of proved dependability for their products.

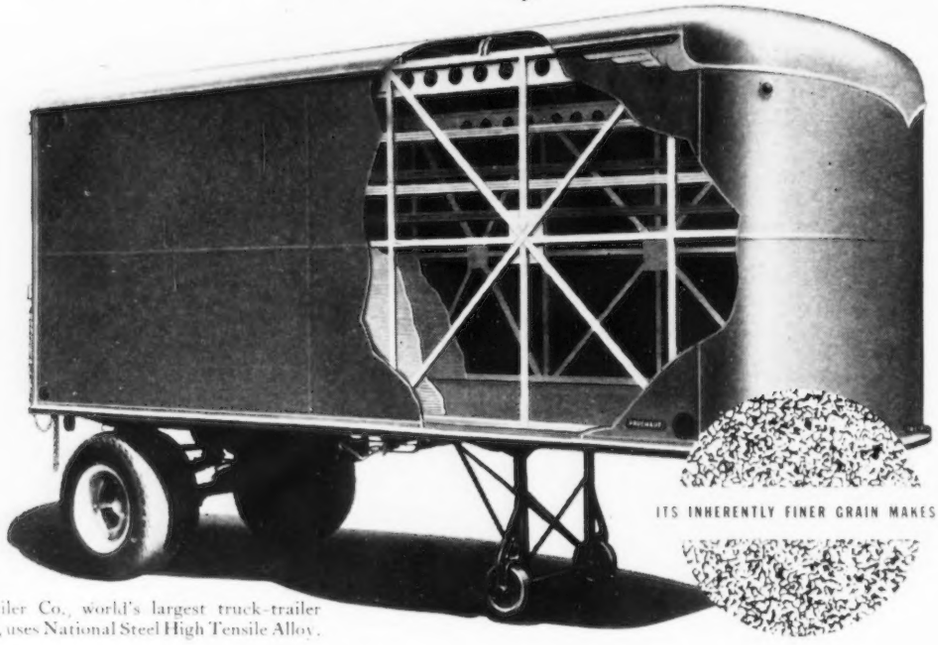
It is, therefore, a high tribute to the uniformity and dependability of Red Cut Superior to have it used so generally by gear manufacturers. You will find it equally dependable in every operation where high speed steel figures in the program. Our Metallurgical Department or our nearest branch office will be glad to co-operate with you.

VANADIUM-ALLOYS STEEL CO. LATROBE, PA

National Steel High Tensile Alloy offers you

HIGH YIELD POINT
HIGH ULTIMATE STRENGTH
HIGH RESISTANCE TO FATIGUE AND IMPACT
EXCELLENT WELDABILITY
CORROSION AND ABRASION RESISTANCE

+ UNUSUAL **Ductility**



ITS INHERENTLY FINER GRAIN MAKES ALL THE DIFFERENCE

Fruehauf Trailer Co., world's largest truck-trailer manufacturer, uses National Steel High Tensile Alloy.

The enthusiasm with which National Steel High Tensile Alloy has been accepted by users all over the country is evidence that it has important properties which set it apart from ordinary high tensile steels.

Chief among these properties is its high ductility—a ductility which permits it to be used in many applications for which other high tensile steels are unsuitable.

Because of its unusual workability, National Steel High Tensile Alloy can be cold formed readily into difficult parts—in most cases without any change in shop practice.

Small wonder then that this steel is finding important new applications almost daily! Small wonder that engineers and production men everywhere are saying—"Here at last is the high tensile, HIGH-DUCTILE steel we have been looking for!"

If you have a production problem that requires a high tensile steel with unusual ductility, consult our engineers about National Steel High Tensile Alloy. It may be just the right answer to your problem.

National Steel High Tensile Alloy is available in sheets, strip, plates, bars and shapes.

GREAT LAKES STEEL CORPORATION · DETROIT, MICHIGAN

DISTRICT OFFICES: *Boston*, 1001 Statler Building; *Buffalo*, 1000 Walbridge Building; *Chattanooga*, Hamilton Bank Building; *Chicago*, 1026 Builders Building; *Cleveland*, 820 Leader Building; *Dayton*, 846 Third National Bank Building; *Indianapolis*, 1215-17 Circle Tower; *New York*, 405 Lexington Avenue; *Philadelphia*, 407 Liberty Trust Building; *St. Louis*, 3615 Olive Street; *San Francisco*, 824 Sharon Building; *Toledo*, 906 Edison Building.

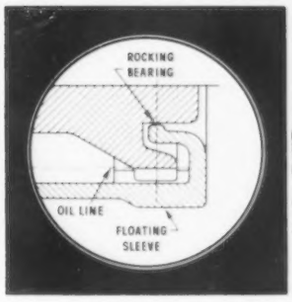
NATIONAL STEEL

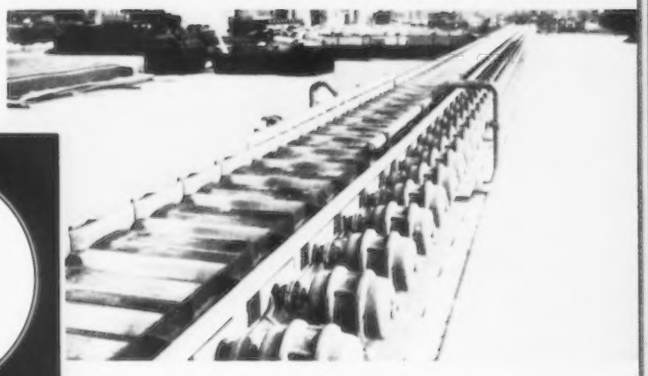
DIVISION OF
NATIONAL STEEL CORPORATION

KOPPERS

DOES A BETTER JOB

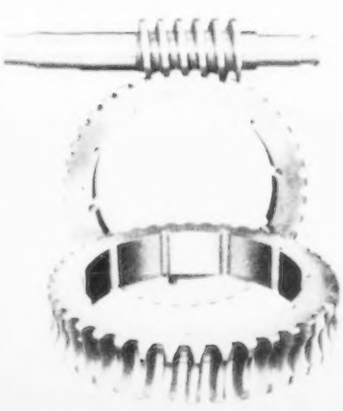
FOR YOU





CONSULT KOPPERS ABOUT ANY LARGE CONSTRUCTION JOB you are contemplating. Koppers engineers are competent to prepare plans, specifications and estimates on general engineering projects. Economical construction is assured when Koppers does the work.

THE PERFORMANCE RECORD OF 100 FAST'S SELF-ALIGNING COUPLINGS in this mill was so impressive that Fast's were selected when 600 couplings were to be bought for a new mill. Fast's are used in the run-out table shown in this photo. The load carrying surfaces are protected against wear by a positive film of oil which is kept permanently clean by the rocking bearings that make precise metal-to-metal contact and are in the one position where they form permanent dust and moisture proof seals.



D-H-S BRONZE GIVES HIGHEST COMBINATION OF DUCTILITY, HARDNESS, STRENGTH. These worm gears of D-H-S No. 2 Bronze, weighing 4,500 lbs. each, have a combination of balanced physical properties found only in D-H-S Bronze:

MINIMUM PHYSICAL PROPERTIES

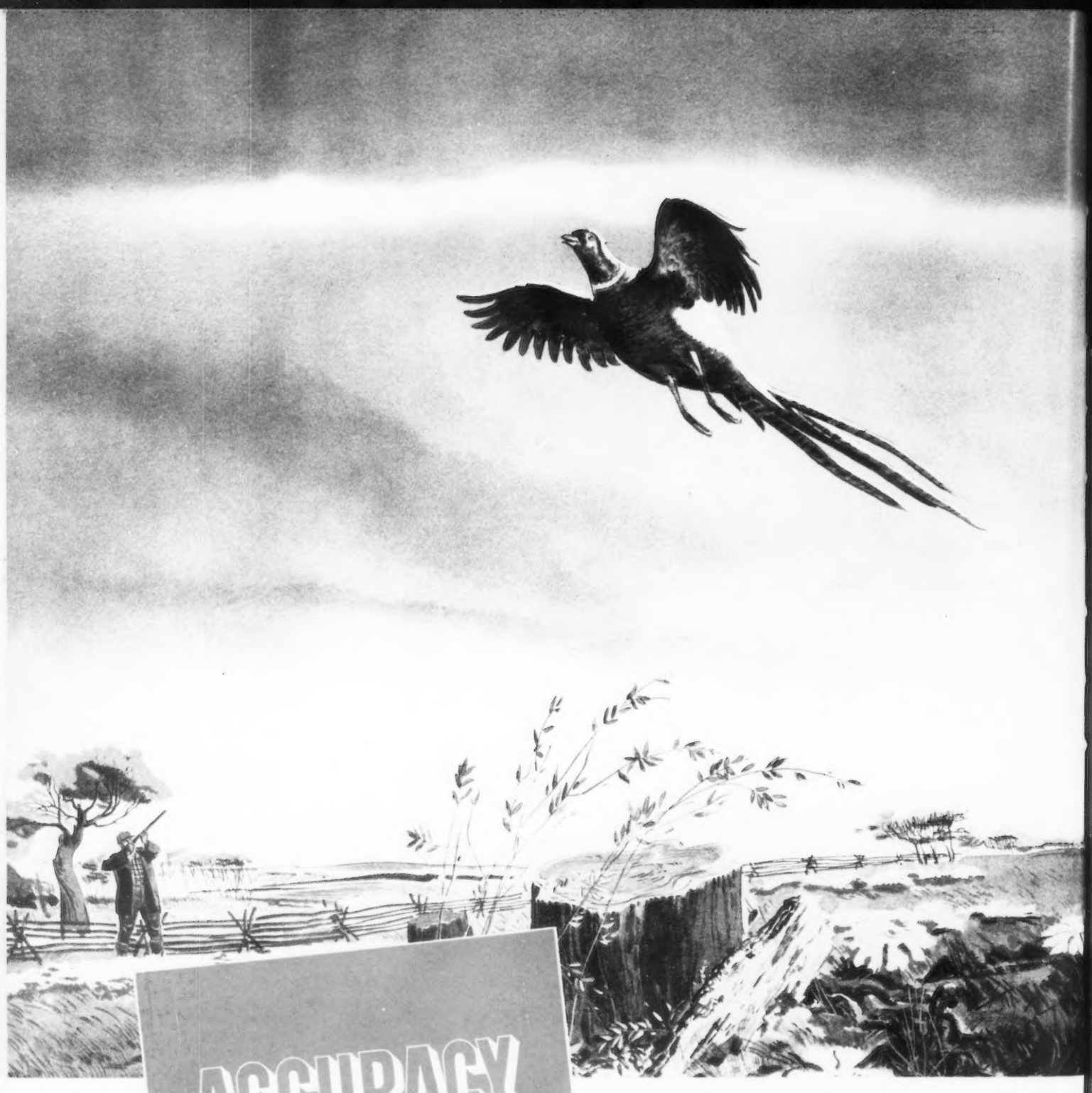
Ultimate Tensile Strength (lbs. per square inch)	115,000
Yield Point (lbs. per square inch)	90,000
Elastic Limit (lbs. per square inch)	55,000
Elongation—per cent in two inches	12
Reduction of Area—per cent	12
Brinell Hardness No.	225
Permanent Set under 100,000 lbs. per square inch	.020

Note: Recommended for applications where lineal contact speeds do not exceed 250 feet per minute.

KOPPERS *products*

Koppers Coke Ovens . . . Koppers Coal . . . D-H-S High Tensile Bronze Castings . . . Pressure-treated Piling, Ties, Structural Timber . . . Koppers Bituminous-base Paints . . . American Hammered Piston Rings and Cylinder Packing . . . Conveying Systems . . . Coal Tipples and Coal Handling Equipment . . . Removal and Recovery Apparatus . . . Gas Holders . . . Waterproofing and Dampproofing Materials . . . Roofing Materials . . . Tarmac for Paving . . . Tank Work . . . Drydock Facilities, Barges.

KOPPERS COMPANY · PITTSBURGH



WHERE **ACCURACY** DETERMINES RESULTS

The more particular you are about maintaining blends, the more you'll appreciate the accuracy with which Koppers coals meet specifications. Koppers is itself one of the largest users of gas and coking coals. The selection of Koppers mines, the choice of production methods and equipment, and supervision and research activities were all dictated by the need for an assured supply of better coal for Koppers own use. By using Koppers Coal you can share these benefits without extra cost. The Koppers Coal Company, Pittsburgh, Pa.

KOPPERS COAL

. . . and the Body is Lighter by 550 lbs.

Coal Truck Body built of "A.W." Dyn-el high strength steel by Rosman Metal Body Co., Inc., 11-15 Broadway, Long Island City, N. Y. 4 ton capacity. Five compartments—three 1-ton and two ½ ton.

Built of conventional steel, this 4-ton Coal Truck Body would weigh 2,850 pounds. Built of "A.W." Dyn-el high strength steel, it weighs only 2,300 pounds . . . a saving of 550 pounds in dead weight. With all its lightness, the body of "A.W." Dyn-el high strength steel is stronger than a conventional body, longer lasting, more resistant to shock, fatigue and corrosion . . . and the truck, itself, because of decreased weight is less expensive to operate.

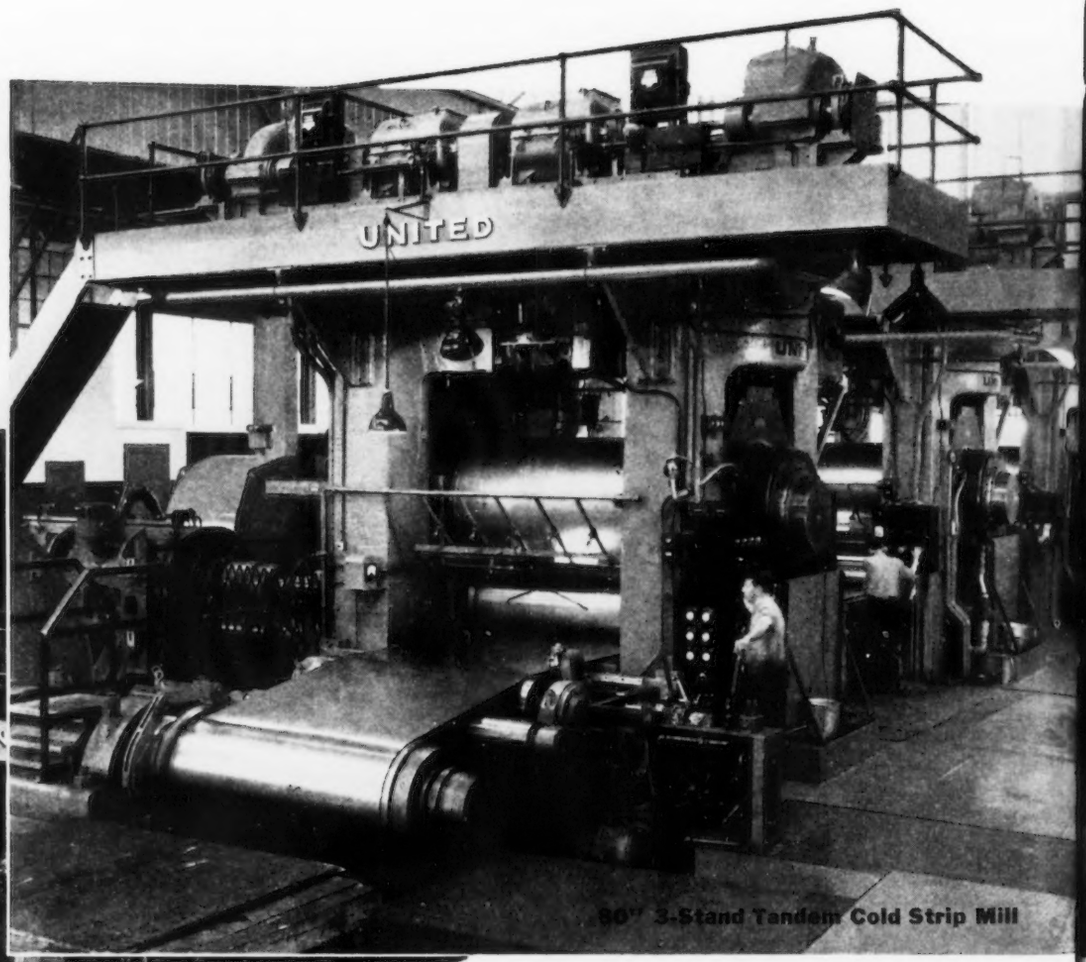
The 48-page book, "A.W." Presents Dyn-el, gives full details of savings in weight and cost possible with this new high-strength, flat-rolled steel. Diagrams, tables and charts cover a wide range of tests and properties. To executives, tables and charts cover a wide range picture of performance and costs. To engineers, it gives complete fabricating and design properties and table of sizes and weights. We will be pleased to send you a copy.

DYN-EL

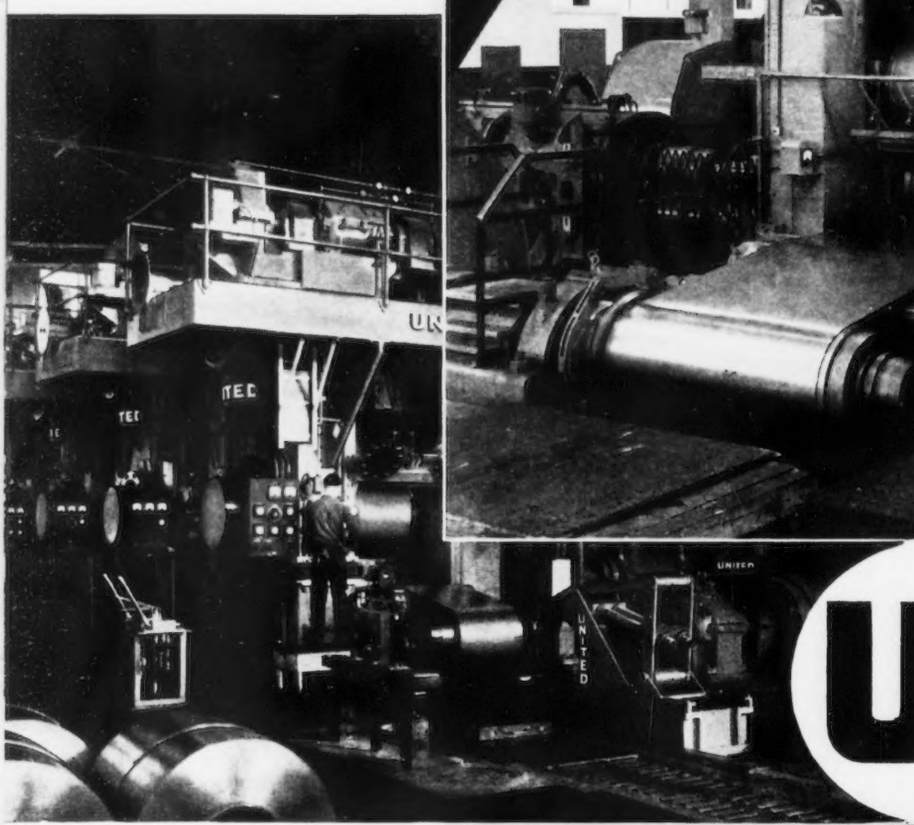
ALAN WOOD STEEL COMPANY

MAIN OFFICE AND MILLS, CONSHOHOCKEN, PENNA. : : SINCE 1826 : : DISTRICT OFFICES AND REPRESENTATIVES—Philadelphia, New York, Boston, Detroit, Chicago, Cleveland, Los Angeles, Seattle, San Francisco, Houston, Roanoke, Buffalo, Pittsburgh, Montreal, Cincinnati, New Orleans, St. Paul, St. Louis, PRODUCTS INCLUDE—"A. W." Rolled Steel Floor Plate : : "Swede" Pig Iron : : Billets—Blooms and Slabs : : Sheared Steel Plates : : Hot Rolled Sheets and Strip : : Steel Products also furnished in Copper and Alloy analyses.

Complete rolling mill

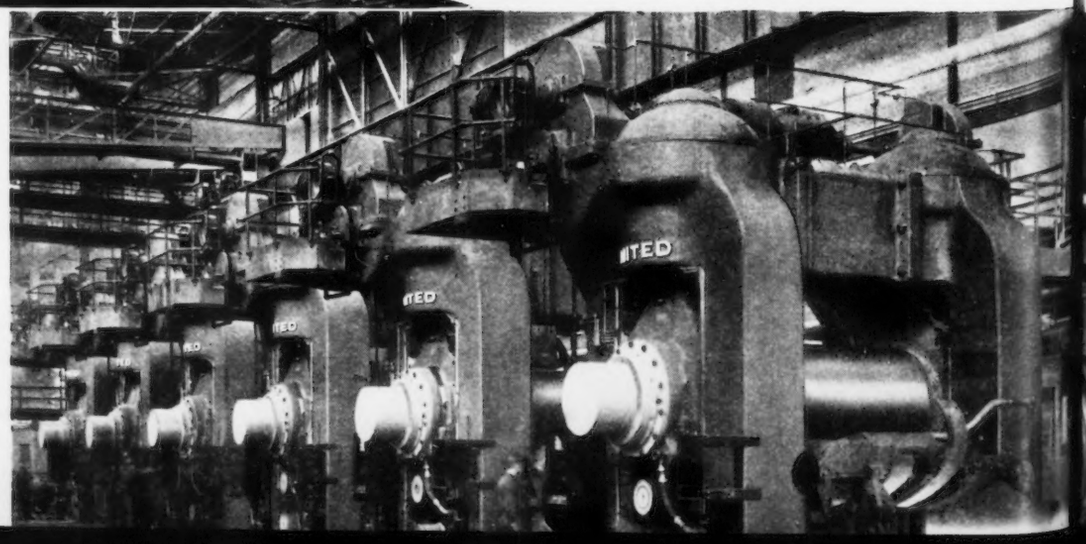


80" 3-Stand Tandem Cold Strip Mill



4-Stand Tandem Tin Plate Mill

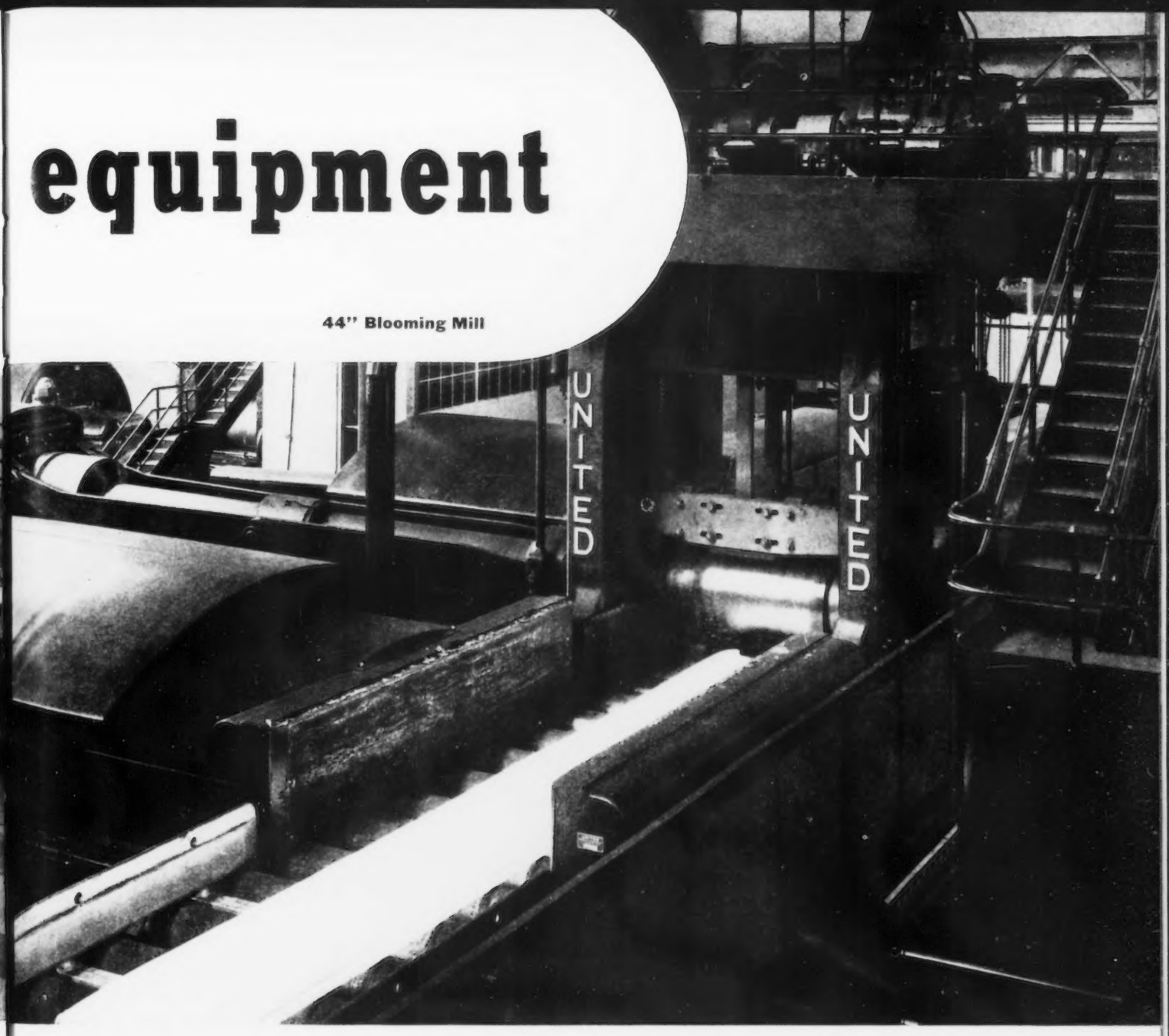
UNITED



98" Continuous Hot Strip Mill

equipment

44" Blooming Mill



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PITTSBURGH · PENNSYLVANIA

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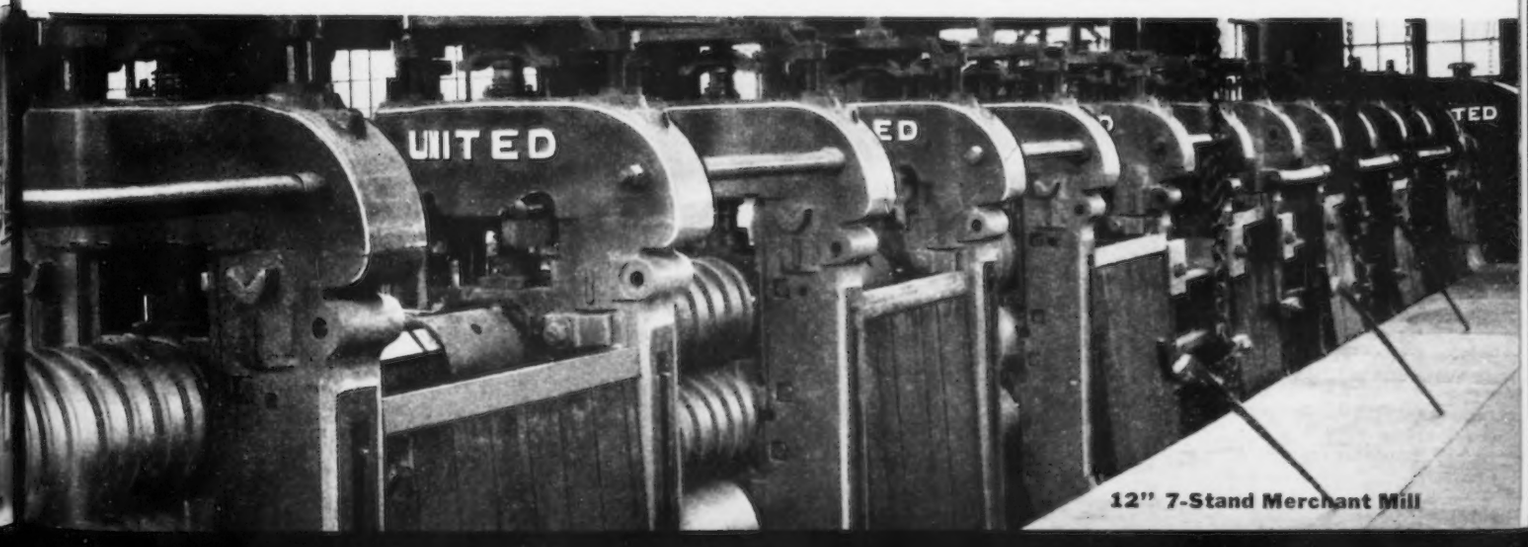

12" 7-Stand Merchant Mill

Information FREE

1. MANGANESE STEEL CASTINGS—New 64-page catalog, containing over 400 illustrations, describes the use of manganese steel castings in equipment requiring resistance to impact and abrasion. The origin, physical properties and the metallurgical explanation of its toughness are also discussed. Information on plant and research facilities and method of manufacture are given. Issued by American Manganese Steel Division, American Brake Shoe & Foundry Co., Chicago Heights, Ill.

2. MACHINING DIE CASTINGS—An unusually comprehensive booklet on practice in machining zinc alloy die castings, containing information of value to die casters, designers and processers as well as those contemplating the use of zinc die castings, is being distributed by New Jersey Zinc Co., 160 Front Street, New York. Machining data given are based on actual commercial practice, each method being the recommendation of some caster, user or tool manufacturer. Spinning, bending and forming, cleaning and finishing, turning, threading, riveting, gear cutting, swaging, and milling are a few of the many subjects covered.

3. LEDALOYL STOCK BEARINGS—Over 300 stock sizes of Ledaloyl bearings are now available from stock, according to announcement made by Johnson Bronze Co., New Castle, Pa., in this catalog. In addition to listing stock sizes, a general description of performance ability and metallurgical properties of the bearings is given.

4. MATERIAL HANDLING — Towmotor Co., 1231 East 152nd Street, Cleveland, is offering a booklet containing 24 full-page action pictures on latest material handling methods featuring the use of gas power industrial tractors and lift trucks.

5. METAL SPRAYING — Metallizing Co. of America, Inc., 1351 East Seventeenth Street, Los Angeles. Booklet, 26 pages, devoted to metal spraying with company's Mogul metallizing gun. Includes new pictures and applications and lists equipment for metal spraying. A separate bulletin announces a new Propane-Mogul gun, use of propane in which is said to reduce gas costs and increase speed of deposit.

6. WIRE MEASURING MACHINES—Durant Mfg. Co., 1929 North Buffum Street, Milwaukee. Wire measuring machines for measuring wire and cable from .005 in. diameter and up are the subjects of this bulletin. There are several different models shown, each of which has several variations for the most convenient set-up for fast, accurate lineal measurement of bare and insulated wire, twisted pairs, wire rope and lead covered or armored cable. Good number visibility is said to be a feature of their design.

7. ARC WELDERS — Lincoln Electric Co., Cleveland. Welder Specification Bulletin No. 314-A, devoted to 150-amp. "Shield-Arc Junior" welder with self indicating dual continuous control. Illustrations show the control set for the same size of electrode or welding current but for different types of arc characteristics.

8. SHIPBUILDING TOOLS—Ingersoll-Rand Co., Phillipsburg, N. J. Booklet illustrates and describes air tools for shipbuilding and repair work. Tools described include impact wrenches, pneumatic drills and reamers, riveters, rivet busters, chipping, calking and scaling hammers, air hoists, sump pumps and rammers.

9. WASHROOM LAYOUTS—Bradley Wash-fountain Co., West Michigan Street, Milwaukee. Ten representative wash-room layouts, selected from the company's files, are reproduced in this booklet. Helpful facts pertaining to fixture capacities and clearances are also given.

10. MICRO-FINISH—Those interested in securing an extremely fine surface finish, a finish measured in millionths of an inch (micro-inches), will find this bulletin, issued by Hill-Clarke Machinery Co., 649 Washington Boulevard, Chicago, to contain much valuable information on the construction of grinders capable of providing this type of finish. The machines described, Norton motor driven grinders, are available in sizes from 6 to 22 in.

11. INDUSTRIAL LUBRICATION — The story of industrial lubricants, their production, distribution and use, is told in this strikingly illustrated booklet prepared by Sun Oil Co., Philadelphia. Practically every industrial use of petroleum products is described and specific recommendations for the type of lubricant best suited to the given task are made.

12. EVAPORATORS—A catalog and reference work intended to supply those interested in evaporating equipment with information concerning design, selection and proper application is now available from Struthers Wells-Titusville Corp., Titusville, Pa. Many pages are devoted to discussions of conditions controlling design and operation of evaporators and a large number of graphs pertaining to the evaporation of various materials are included.

If you want the latest information in these brochures, encircle the numbers and mail coupon to . . . . .

THE IRON AGE · 239 W. 39th ST. · N. Y. C.

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COMPANY .....

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ENCIRCLE LITERATURE BY NUMBERS

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4	5	6
7	8	9
10	11	12

LENGTHENS TOOL LIFE FROM
2 HOURS TO 8
• FOUR TIMES the tool life between regrinds meant a sizeable saving in costs and tool room labor, plus a decided increase in production for a Michigan valve manufacturer.
The job was a machining operation on high alloy steel valves. A number of cutting oils had been tried but with the best of them it was necessary to regrind the tools every two hours. Finally, a Standard Lubrication Engineer was given a chance to analyze the job. He recommended Premier Cutting Oil No. 110.
With Premier, cutting tools lasted a full 8 hour day. No other change was made in the operation.
Why not have one of these Engineers look over your machining operations? He may have a number of cost-saving suggestions to make. It will cost you nothing.
Copr. 1939, Standard Oil Co. (Ind.)
PREMIER
CUTTING OIL
FIRST IN SERVICE
FOR FIFTY YEARS
STANDARD OIL (IND.)
STANDARD OIL COMPANY
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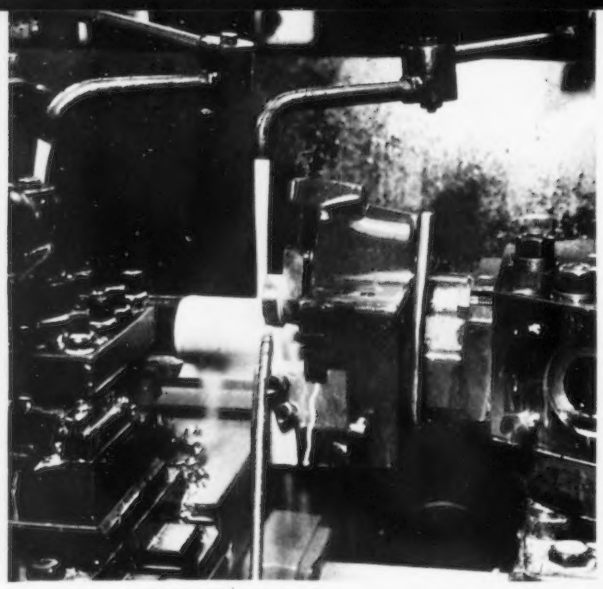
...LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LUBRI

YOU CAN GET THE SAME SERVICE THAT MADE MONEY FOR THESE MEN...

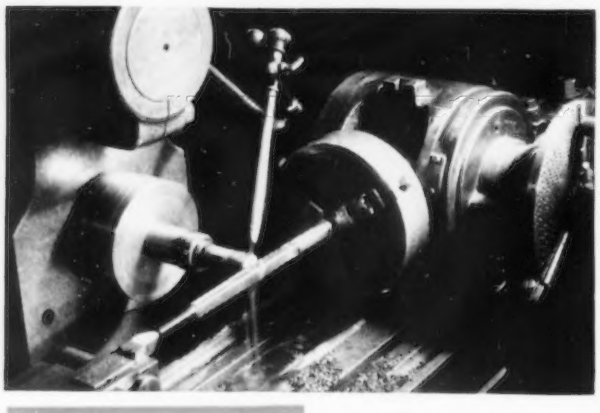


SUPERLA SOLUBLE OIL

Attractive claims or low prices have tempted a St. Louis manufacturer to try many brands of soluble oils during the past ten years. Today he still depends entirely upon Superla Soluble Oil.

He gets 25% to 30% better tool life, for one thing. For another, he found Superla particularly outstanding for rust prevention and even the operators noticed its effective cooling quality.

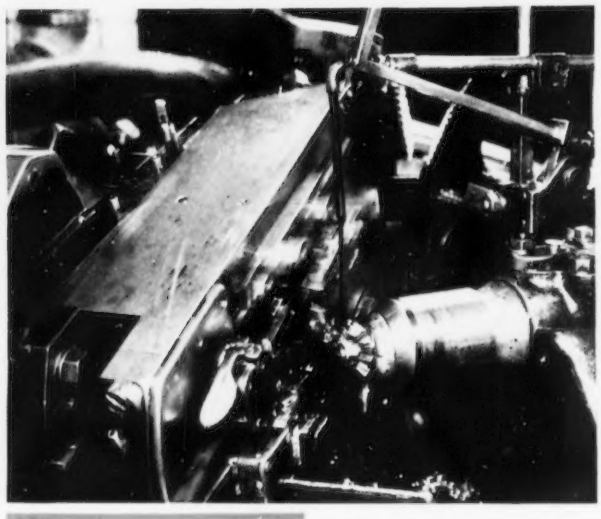
Tests on milling, drilling, grinding, and other operations in his shop have convinced this manufacturer that Superla Soluble Oil has everything he needs. Maybe it has something to offer you. A Standard Lubrication Engineer will gladly help you test it in your plant.



PREMIER CUTTING OIL

Your machine operators will tell you one thing that they like about Premier Cutting Oil the minute they see it. That is its clean, transparent color. They know how easy it will be to see the work—to get better finish and greater accuracy.

Where work visibility would be an advantage, try Premier. A Standard Lubrication Engineer will be glad to help you pick the job and recommend the right grade of oil for it.



ACME CUTTING OIL

Things looked serious for a gear works superintendent when he found that he was only getting 6 to 8 bevel gears per tool grind on a new job. Tool cost and production time would soon eat up the profit. He didn't waste any time in putting out an SOS for the Standard Lubrication Engineer.

What was the trouble? The Engineer analyzed the job. The cutting oil was being used successfully on other jobs in the plant. Machines were the same. But the gears were being machined from tough alloy steel stock. He recommended Acme Cutting Oil No. 80 to handle it.

Without any other change except cleaning and filling the machine with Acme, 52 gears were produced before the first tool had to be reground. The finish, which had been very poor, now was also 100% satisfactory.

DO YOU WANT HELP ON A LUBRICATING PROBLEM?

Have you a bearing that runs hot . . . a conveyor that takes too much power . . . oil sludging in gear cases or compressors? These are but a few typical problems recently solved by Standard Lubrication Engineers.

Your lubricating trouble may be different, but the results will be the same when a Standard Lubrication Engineer has helped locate the cause. Bearing failures stop . . . power costs drop . . . maintenance and oil costs get back in line. What's more, this helpful service will cost you nothing.

If your plant is located in the 13 states shown above send the coupon or call your local Standard Oil (Indiana) office. Just ask to have the Standard Lubrication Engineer see you.

STANDARD OIL COMPANY (Indiana), JULY
910 South Michigan Ave., Chicago, Ill. Room 1223

Please have the Standard Lubrication Engineer in my locality call on me.

Name _____

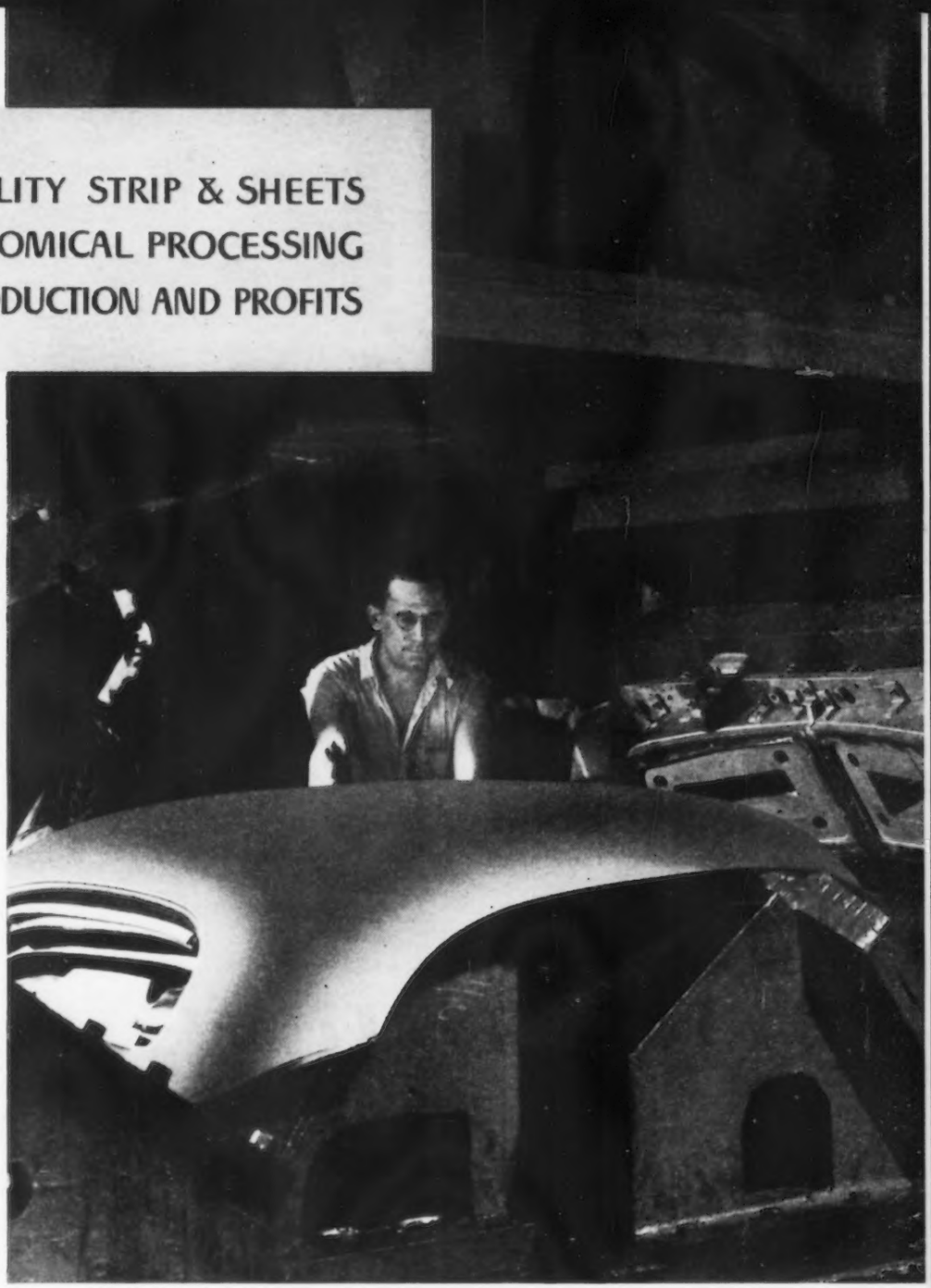
Company _____

Address _____

City _____ *State* _____

(Must be one of the 13 states shown on the map)

J&L CONTROLLED QUALITY STRIP & SHEETS GIVE YOU EFFICIENT ECONOMICAL PROCESSING WHICH HELPS STEP UP PRODUCTION AND PROFITS



You can widen your margin of profit by cutting production costs with J & L Strip and Sheets . . . made from J & L Controlled Quality Steel. For J & L Strip and Sheets have extra smooth finish, deep drawing properties and superior forming characteristics that increase the efficiency of your manufacturing operations. With J & L Strip and Sheets you have less loss of time through press rejects, smoother production, better-looking, more-satisfactory finished products of longer life and safety. Making J & L your partner in production is an easy, economical step to take. Ask to see one of our metallurgists to survey your needs and problems.

J & L—PILOTS THE COURSE OF CONTROLLED QUALITY IN STEEL

JONES & LAUGHLIN STEEL CORPORATION

AMERICAN IRON AND STEEL WORKS
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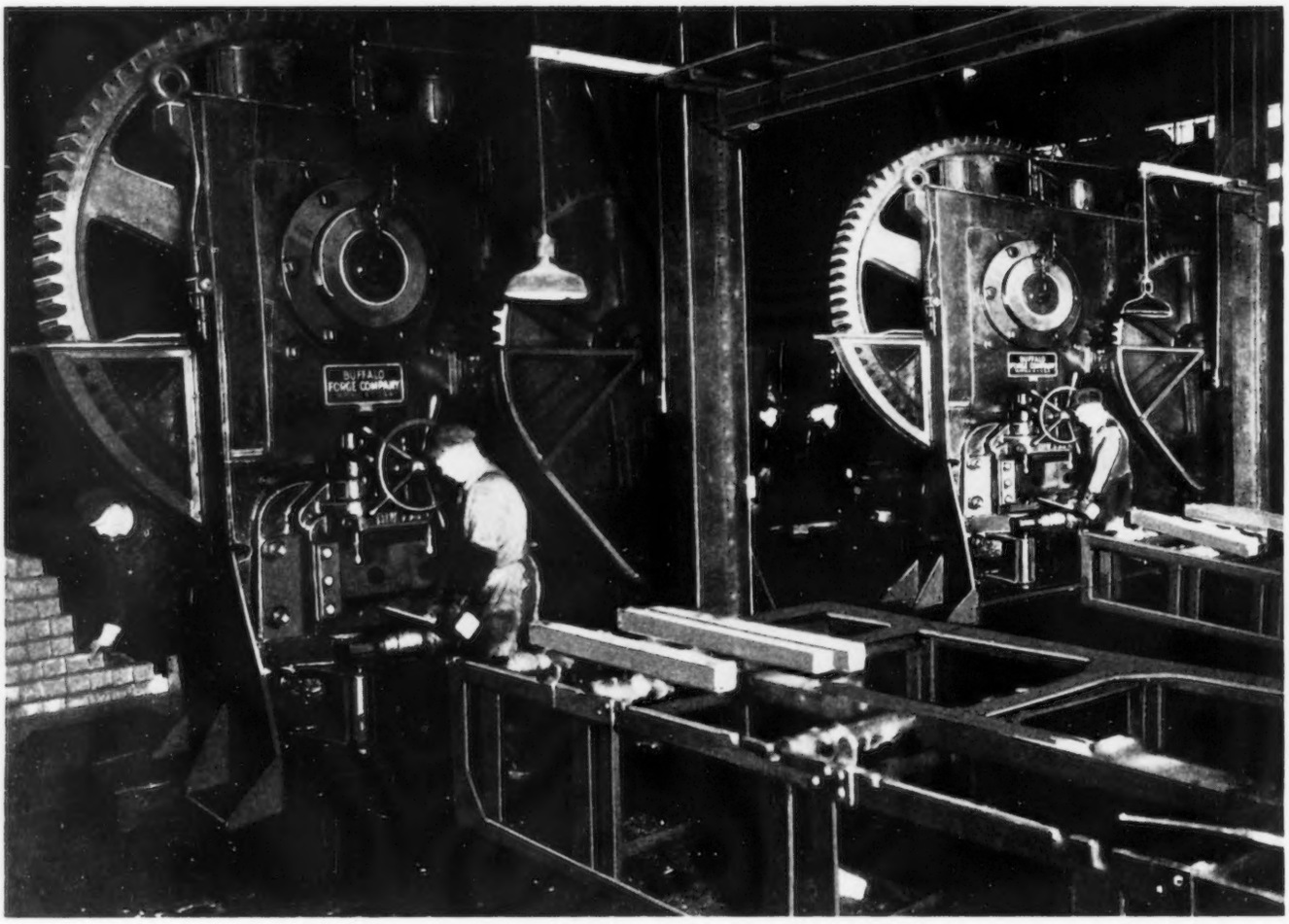

TOUGH SHEARING JOBS MADE EASY!

If modern labor-saving machines were ever needed in your plant. it is on those tough. tedious. back-breaking billet and bar-cutting jobs. That's why so many of America's steel working shops have installed Buffalo Billet Shears and Bar Cutters.

Here are machines that will put your billet shearing on a production basis and keep it there—24 hours a day if necessary—year after year. The only Billet Shears with all welded frame.

BUFFALO FORGE COMPANY

492 Broadway **Buffalo, N. Y.**

Branch Engineering Offices in Principal Cities

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THE IRON AGE

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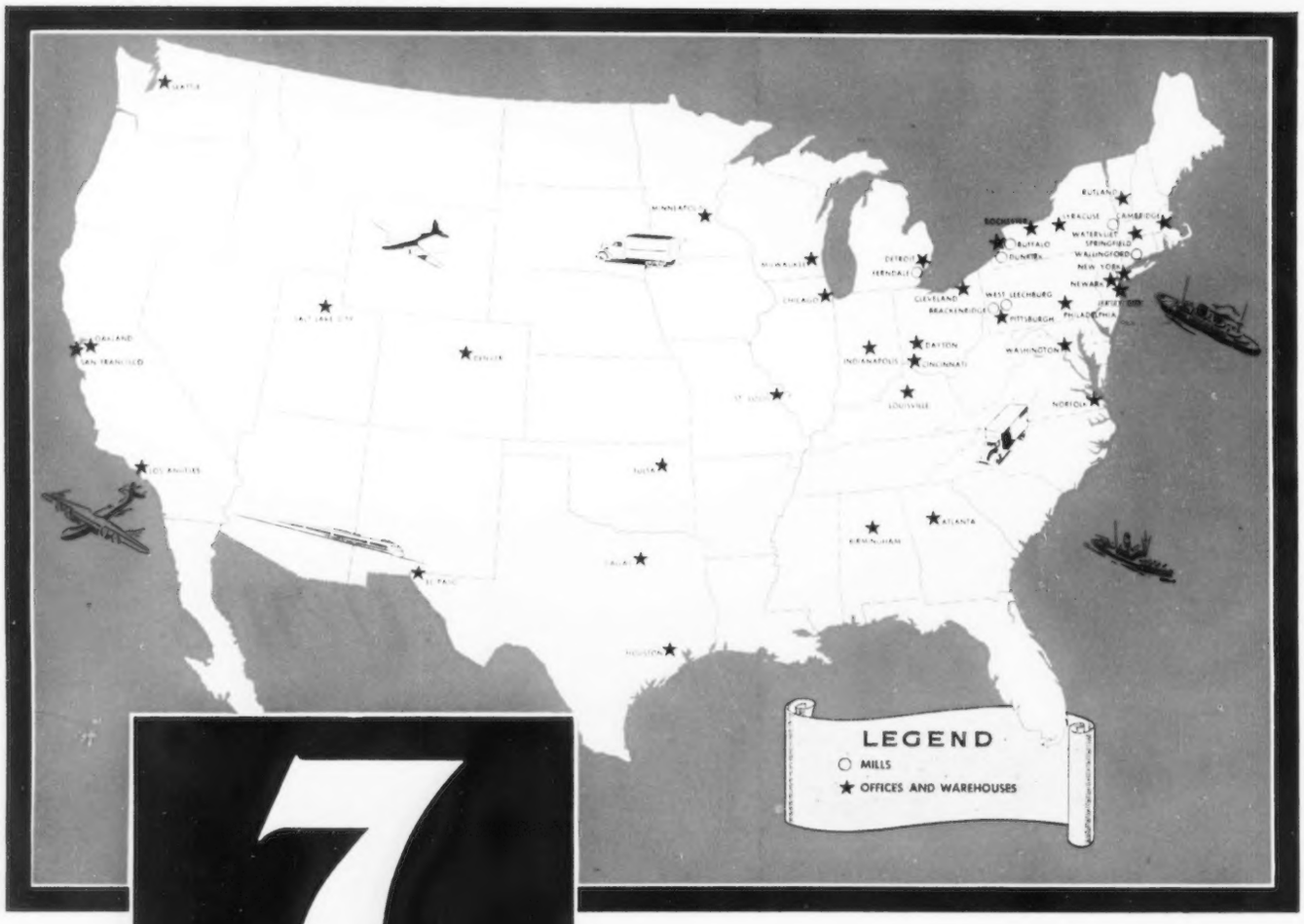

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▲▲▲ THE IRON AGE ▲▲▲

JULY 13, 1939

ESTABLISHED 1855 Vol. 144, No. 2

"Why Worry About the Machine?"

ONE of our contemporaries seems a bit perturbed over THE IRON AGE's current campaign in defense of mechanization. It devotes a page in a recent issue to asking the question: "Why Worry About the Machine?"

We admit that the abolition of worry, like the abolition of poverty and of the need of working for a living, is an enticing subject. Why worry about Hitler, or cotton surpluses or the Japanese beetles? In fact, why worry about anything? Why not adopt that pleasant point of view embodied in the injunction "Eat, drink and be merry, for tomorrow we die"?

Even those sybarites who attempted to banish care by this formula must have been worried a bit about the future, or they would not have mentioned the fatal tomorrow. They would have let it go at "Eat, drink and be merry."

As a matter of fact, in this world of ours, worry is the fuse that lights the firecracker of action. Show me a man who has never done any worrying and I will bet my bottom dollar that his record of accomplishment is either a zero or a minus quantity.

Louis Pasteur started to push the science of medicine ahead when he began to worry about rabies and typhoid fever. Columbus did his share of worrying before he got to the new continent. Our pioneer forefathers worried about the Indians and cold and hunger and grizzly bears. It they hadn't, they would have lost their scalps or have frozen or starved to death or been eaten and we would not be here today.

"Why worry about the machine?" Isn't it worth worrying about? Ask the man who makes one and the man who owns one. They know that worry is a necessary and essential factor in the art of staying in business and making a profit. And in the equally necessary and difficult task of defending a position attained by a company, an individual or an industry.

So we bid our contemporary, in all kindness, not to worry about the worrying that we are doing about the attack on mechanization and improvement. Nor to worry because we are getting machinery builders and users to do some worrying with us on this subject. It is just the necessary prelude to the positive, constructive action that ensues when enough energetic and determined men conclude that a real job must be done.

Two Modern Strip Mills are Teamed Together for Better Service to Inland Customers

In 1932 Inland installed one of the country's first wide continuous strip mills. This 76″ unit now has a new running mate . . . . one of the country's highest speed mills, capable of rolling a mile of steel a yard wide in 2½ minutes.

This new 44″ mill increases Inland's flat rolled steel capacity 45,000 tons per month, greatly expanding our facilities for prompt service to customers. Its higher speed and numerous improved mechanical features also permit more effective control over quality and uniformity of output.

Temperature control, for example, is made automatic as the hot strip enters the finishing stands, by an electric pyrometer which "looks" at the steel, records its temperature and sounds a warning if there is any variation.

Important also to steel buyers is the fact that this new mill is matched with equally modern steel making and finishing equipment . . . all of it new within the past few years, from blast furnace and open hearths to cold finishing mills, annealing furnaces, tin mills and galvanizing department.

We are confident that these new facilities now enable us to produce, not only more, but better sheets and strip. Your nearest Inland office will make this improved service promptly available to you.

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SHEETS STRIP TIN PLATE BARS PLATES FLOOR PLATES STRUCTURALS PILING RAILS TRACK ACCESSORIES REINFORCING BARS

Why Buy NEW MACHINE TOOLS?

By J. R. WEAVER

Director, Equipment, Inspection and Test, Westinghouse Electric & Mfg. Co.

° ° °

WHY do we buy machine tools? Last year the Westinghouse Co. spent approximately $5,000,000 on new machine tools and manufacturing equipment, and this year has already spent about $2,000,000. The primary reason for buying new tools on the part of any progressive manufacturing industry is, of course, to give its customers high-quality products at competitive prices. Other reasons are the creation of new products, redesign of existing products, shortening of the work week, and increased labor rates.

The product engineer is continually redesigning his product, whether it be motor, automobile, refrigerator or what not, for the purpose of increasing its efficiency, reducing cost, or building into it sales appeal. In the redesign, one of the major requirements is to build a better product for the same money or an equivalent product for less money. Naturally, the equipment and tool engineer is called into the picture to make his contribution to meet these requirements.

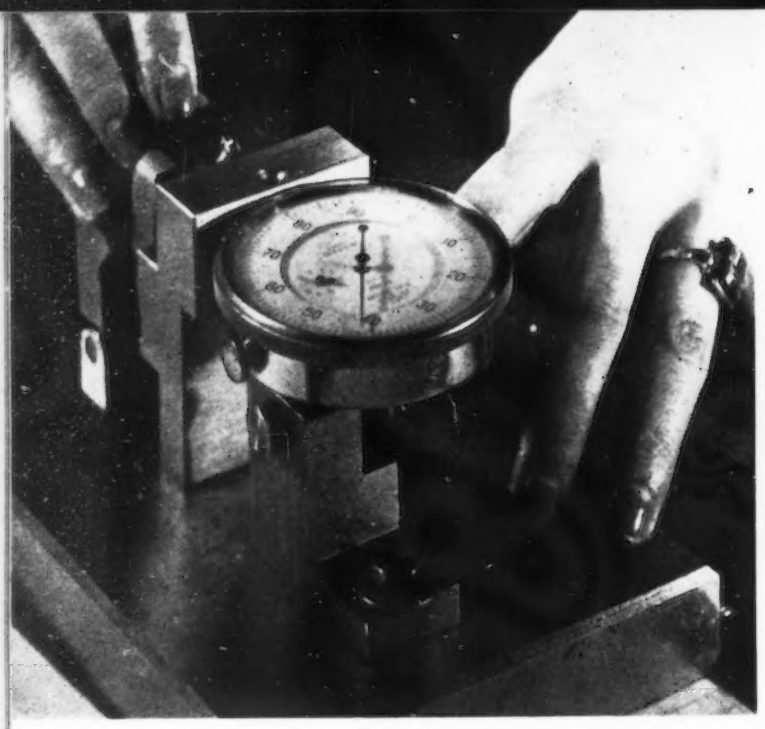
The automotive industry and the refrigerator industry, for example, require new tooling programs every year, not only for the purpose of reducing the cost of the product but primarily because the engineer has brought out a new design which has certain features in it that make it a better product, and these particular features cannot be produced on the same equipment economically. Hence the necessity for new machine tools. True, in order to justify this added investment, there must be savings. These savings are principally due to the design of the product and not to the installation of the new machine tool.

Electrical engineers may redesign motors, changing some part so that instead of its being made on a turret lathe, it can be produced more economically on a multiple-spindle screw machine. That naturally obsoletes the turret lathe and requires the purchase of a multiple-spindle screw machine. Many examples of this kind could be given because the design engineer is continually improving his product to make it more efficient and to increase sales. The purchase of equipment to produce it may be only incidental.

When improvements in products are considered, it is important to note as a contributing factor those products that are the influencing factor on other products, as for instance measuring equipment. Today, an unskilled operator can measure to a higher degree of accuracy than was possible 25 or 30 years ago by the most skilled mechanic. The fact that it is possible to measure on a production basis to a higher degree of accuracy again makes necessary the installation of improved equipment that can meet these greater accuracies. Recently, the writer saw a practical shop measuring device that would measure to a millionth of an inch. The machine tool manufacturers will have to develop machine tools capable of producing such accuracies. Again, it will mean replacement of present equipment with equipment that is superior to anything being produced now.

The writer currently has doubts as to whether anyone can give an accurate definition of "surface quality." In other words, "how smooth is smooth?" Before a standard can be established, a method of measuring is needed. Some progress has been made in developing measuring instruments for measuring smoothness. As these instruments are developed so that they can be used practically in the shop, it will be necessary for the machine tool to produce finishes to a measured standard. Product engineers will again be able to improve their design and improve the efficiency by being able

From an address by Mr. Weaver at the recent fourth annual Machine Tool Electrification Forum, sponsored by the Westinghouse company.



TODAY, unskilled workers measure more accurately than a skilled mechanic did 25 years ago. Here, the gage measures end-play in a completed shaver motor. The maximum "play" must not exceed 0.001 in.

definitely to specify smoothness or surface finish.

Production and Purchasing Power

Many events during the last seven or eight years will have a great influence on replacing old machine tools and the necessity for new equipment. There must be a definite relation between purchasing power of the individual and costs of a product. If the purchasing power of 1929 were compared with that of today, it would undoubtedly be found that the dollar went a great deal further in 1929. Apparently, this relation of purchasing power to cost has been definitely disturbed so that today the standard of living has been reduced. The contributing factors to this reduced standard of living might be, for instance, the shorter work week, which has been established at 40 hr. instead of 48 hr. With the same equipment, a workman cannot produce as much work in 40 hr. as he did previously in 48; therefore, there is less production per employee.

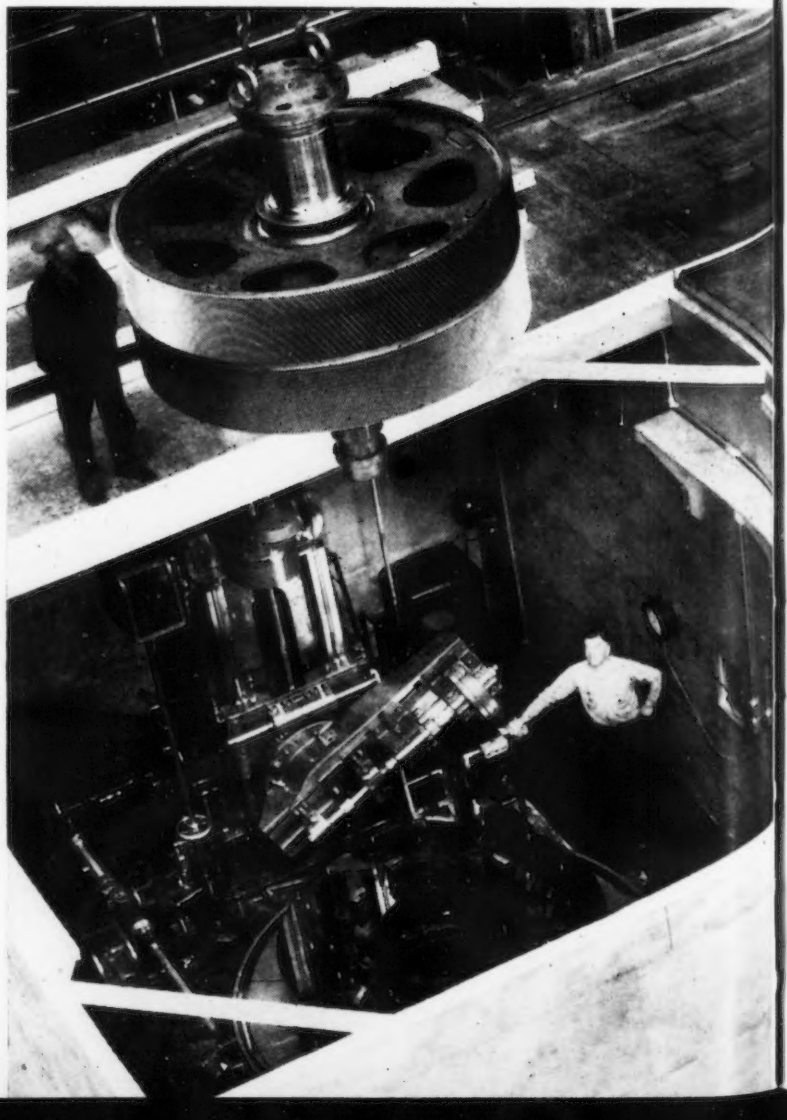
Also, during this same time, wages have been increased. This is also added to the cost, as well as all these added taxes so frequently in the news. All of these things have contributed to the unbalance of production and purchasing power. There is only one way to bring them back to the same relationship as in 1929 or to improve this relationship, and that is by increasing human efficiency. Human efficiency can be increased by better manufacturing equipment. Therefore, as far as the manufacturing industry is concerned, maybe all of these supposed mistakes that the nation has made during the last five or six years might prove to be of great advantage.

In the past, during periods of low activity, the search has been for a new product that would pull the country out of the depression. This time, it might be the correcting of these scrambled basic conditions that establish the country's standard of living.

Less Skilled Labor

The machine tool and the tool engineer have been gradually transferring the skill of the mechanic from the man to the machine. In many operations today requiring the highest accuracy, unskilled or semi-skilled labor with adequate equipment has been able to meet the demand. For this reason, during the last 10 years, there has been a certain amount of curtailment in the training of skilled help. As business improves and activities increase in the shops, there will again be a shortage of skilled help. New machine tools and manufacturing equipment will have to be developed to reduce the need for great skill.

Such trends are definitely here, and will continue to grow. Progressive industries have recognized them and taken steps to meet the demands.



MACHINE tools are meeting the special needs of industry; for example, gears are being cut in air-conditioned rooms for increased accuracy, as shown here.

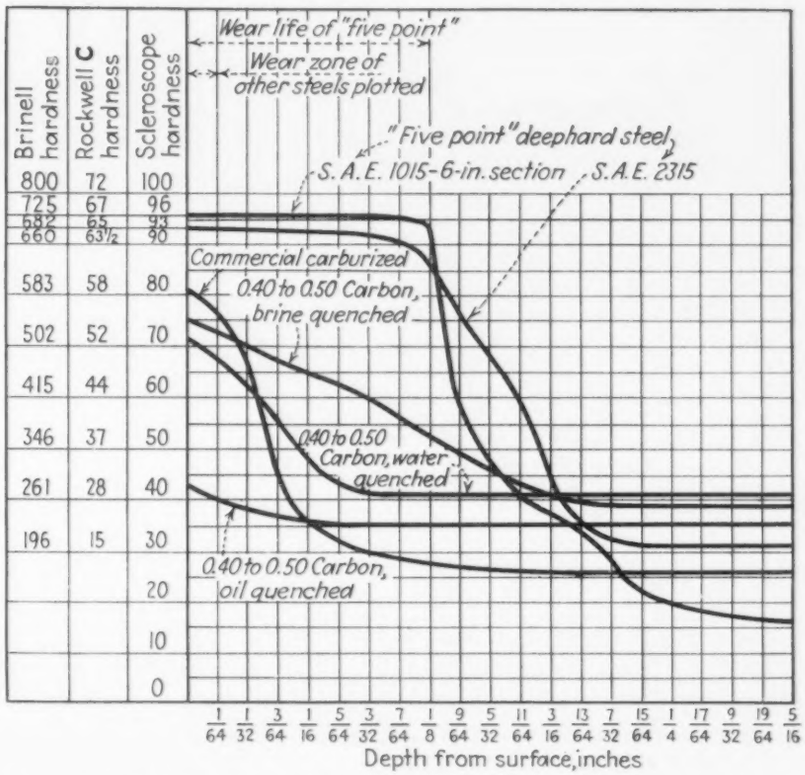
"FIVE-POINT" DEEPHARD STEEL

THE descriptive term "Five-Point" Deephard Steel is the registered trade-mark of any steel regardless of SAE analysis, manufactured and processed by Foote Brothers Gear & Machine Corp. by means of a special process to impart high surface hardness, great depth of hardness, and gradual fusion of this hardness with the core area.

Many of the products made by Foote Brothers, such as gears of all sizes, speed reducers, shafts, and similar products, require more than a light surface hardness depth of 0.020 to 0.030 in., and once in a great while more than 0.040 in. In the majority of applications these products have to withstand great surface abrasion, and occasionally very high or constant repetitive shocks, and heavy material stresses, all of which tend to induce spalling, fatigue, or impact failure because of too thin a surface hardness or a poor and insufficient bond or fusion between the hardness zone and the core area. There has thus been a necessity of developing a process to give hardness depths of from 0.187 to 0.250 in., of obtaining the maximum surface hardness which can be secured with a spall-resisting grain structure, and, equally important, of obtaining a gradual and even fusion of this hardness with the core area.

By means of the recently developed "Five-Point" hardening procedure, surface hardnesses are said to be obtained which range consistently from 60 to 68 Rockwell C, depending on the analysis of the steel. Furthermore, hardness uniformity has been quite satisfactory. Hardened surfaces, as for example a surface 6 x 9 in., have been tested over their full surface on a Rockwell machine, with readings taken ½ in. apart in both directions. The maximum variance noted on any piece tested was two to three points, according to the company, while on the majority of tests the degree of hardness obtained was practically even throughout the entire surface.

Complete control of carbon impregnation is said to be afforded by the process. As a result, it is possible to set a limit of 1.15 carbon throughout, although for most applications this content is restricted to limits of 0.93 to 1.10 C. With impregnation periods shorter in duration than would be necessary with carburizing, it is said that depths of wearing surface hardness up to 0.320 in. have been obtained. While no effort has been made to go beyond this depth, results obtained to date indicate that this is entirely possible and would require no special technique other than a proportionate increase in the period of carbon impregnation. On the other hand, these fast and penetrating qualities are said not to add any difficulties to obtaining a minimum depth of hardness; for every-day hardness depths as light as 0.020 in. are being turned out.



PENETRATION of "wear life" hardness in "Five-Point" Deephard Steel, as compared with carburized steel and high-carbon "hardened processed" steels.

In the gradual drop of hardness and the even rate of its fusion with the core area that is obtained with "Five-Point" Deephard Steel, as shown in the accompanying illustration, two benefits of material value are obtained—a self-supporting zone of hardness is secured which, in addition to the strength it adds to the hardened part as a whole, acts as a support to the wearing surface zone of hardness, materially strengthening the latter.

Going beyond the development of the "Five-Point" process and its application to all SAE low-carbon steels, Foote Brothers has collaborated with a large alloy mill in developing a special analysis of steel which, when processed by the "Five-Point" Deephard Steel process, will produce in a commercial steel an extremely satisfactory combination of high surface hardness and of high strength. The result of this joint development is a nickel-molybdenum steel which, when processed, shows the following core physical properties obtained with a 1-in. round sample: 156,000 lb. per sq. in. yield point; 216,000 lb. per sq. in. ultimate strength; 11 per cent elongation in 2 in.; 29.8 per cent reduction of area; Izod of 25 ft.-lb.; a surface Brinell hardness of 725; a ¼-in. section Brinell hardness of 495; and a core hardness of 429.

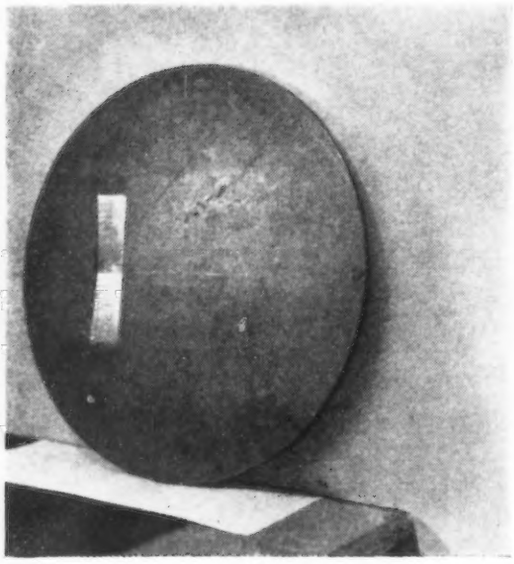


FIG. 1—This test groove 1/8 in. deep was machined in the 3/4 in. plate to test the equipment on local thin spots.

THERMOFLUX

THE thermal process, Thermoflux, here described, offers a convenient method of field inspection for wall thickness measurements where only one side of the metal is available for test.

THERE are many cases in industry where metal plates are subject to progressive changes in thickness and in which the extent of the change is difficult to measure. Boilers and pressure vessels are frequently subject to corrosion of such a general type, or in such inconvenient locations, that holes are drilled through the wall for measurement. Where further corrosion may take place or where stresses are a factor, the subsequent plugging of these holes creates an undesirable source of weakness. A non-destructive field test for wall thickness is therefore desirable, from a safety point of view, especially if it can be used rapidly at many different locations on a structure and thereby insure that unexpected weakening has not taken place.

Several methods have been described in which the electrical resistance of a portion of the plate is used to indicate the wall thickness.[1] A Kelvin bridge may conveniently be used to measure the actual resistance between two contact points; and a scheme for measuring current distribution in a thick plate independently of resistance has been described by A. G. Warren.[2] This latter method depends on the difference in potential gradients outside of the line between the main contact points in thin and thick material, and by making two sets of measurements with different distances between contact points and potential points a thickness factor may be derived.

The thermal device designated as Thermoflux, here described, was developed after some experience with electrical methods and was found to be highly suitable for the purpose intended.

The measurement is made by applying a controlled rate of heat application for a limited time, and measuring the resulting rise in temperature. For steel boiler plate, the heat is most conveniently generated in the metal itself by an alternating current magnetic yoke held in contact with the surface. Between the legs of the yoke a thermocouple is applied, and the rise in temperature after a definite length of time is used as the thickness indication. The temperature reached will be a function of both the magnetic properties of the steel and of its heat conductivity, but it has been found that in the normal range of low carbon steel there is not enough variation to affect the readings. No attempt has been made to reach great refinement, as indications accurate to ± 5 per cent are sufficient for the intended inspection.

Certain obvious precautions must be taken, foremost of which is the effect of measurements close to a free edge of a plate. The distance in, from a straight or curved edge, or a right angle corner, is readily taken into account, but the proper correction factors have not as yet been measured. This edge effect is mostly of interest in calibrating the apparatus on steel sheets of various sizes, as free edges do not occur in regular inspection. The reverse effect is of importance when inspecting near heavier sections such as close to a butt strap or other riveted joint, or on the more complicated tube sheet. Experience on new boilers is sufficient to indicate the degree of correction required.

Scale up to 0.002 in. is not important under the pole piece of the yoke, but it is necessary to clean the surface where the thermocouple is located. Much of the customary difficulty in measuring surface temperature with a thermocouple may be avoided by immersing the contact point in a drop of glycerine. The present yoke was designed for flat plate or surfaces of large radius of curvature such as 48 in. diameter dished heads. For sharp curves such as the knuckle of the dished head, tubes and pipe, a special pole piece may be necessary, and a smaller yoke is required for sections thinner than 3/8 in.

The wall thickness test is intended for average conditions or local conditions reaching a considerable area of

[1] Putnam, U. S. Patent No. 1,895,643, Jan 31, 1932.
[2] I.E.E. Journal, Vol. 84, No. 505, January, 1939, A. G. Warren.

MEASURES PLATE THICKNESS

By ALFRED V. DE FOREST
Massachusetts Institute of Technology

decreased wall thickness. In order to check up the behavior of local thin spots, a depression ⅛ in. deep at the center and tapering to full wall thickness over an extent of 8 in. was machined in a ¾ in. thick plate. This groove is 2 in. wide. (See Fig. 1.) This local depression gave galvanometer scale readings of 4.14 against 3.47 for a 60-sec. test, and 7.52 against 6.50 for a 120-sec. test. The percentage difference in the two cases is 16 per cent and 13.5 per cent. The difference is naturally less than the difference betwen ¾ in. and a ⅝ in. plate but indicates the ease with which variations in plate thickness may be measured, even though the local reduction is in a small area. It is expected in use, that the uniformity of wall thickness at different locations may be easily and rapidly checked. Fig. 2 shows the rise in temperature in various amounts of time on different thicknesses of material. Successive tests show insignificant variations between readings and differences of the order of 1/16 in. in an inch-thick plate can readily be discovered with only single readings. By averaging a number of readings, even smaller changes in thickness can be detected.

Fig. 3 shows the galvanometer scale reading on various thicknesses of metal when the device is applied for different lengths of time. Quite evidently, the thicker plates must be heated for at least 120 sec. to give significant figures. The shape of the curves show the approximate length of time for the different thickness ranges. As stated before, this yoke was intended for thicknesses approximately ½ in. to 1½ in., and for thinner walls a smaller device would be used. Also for thicker walls a larger yoke, rather than longer times, would be convenient. It has been found, however, that times up to 300 sec. can be used, in which case thicknesses of the order of 4 in. can be measured.

Other tests were run where still, cold water was in contact with the plate on the inside of the vessel. In this case the curves are consistent but naturally the temperature reached for a given length of time is less. The results under such conditions can therefore be relied on particularly in cases where it was not convenient to empty a pipe line, tank, or boiler drum. This condition might also be met in

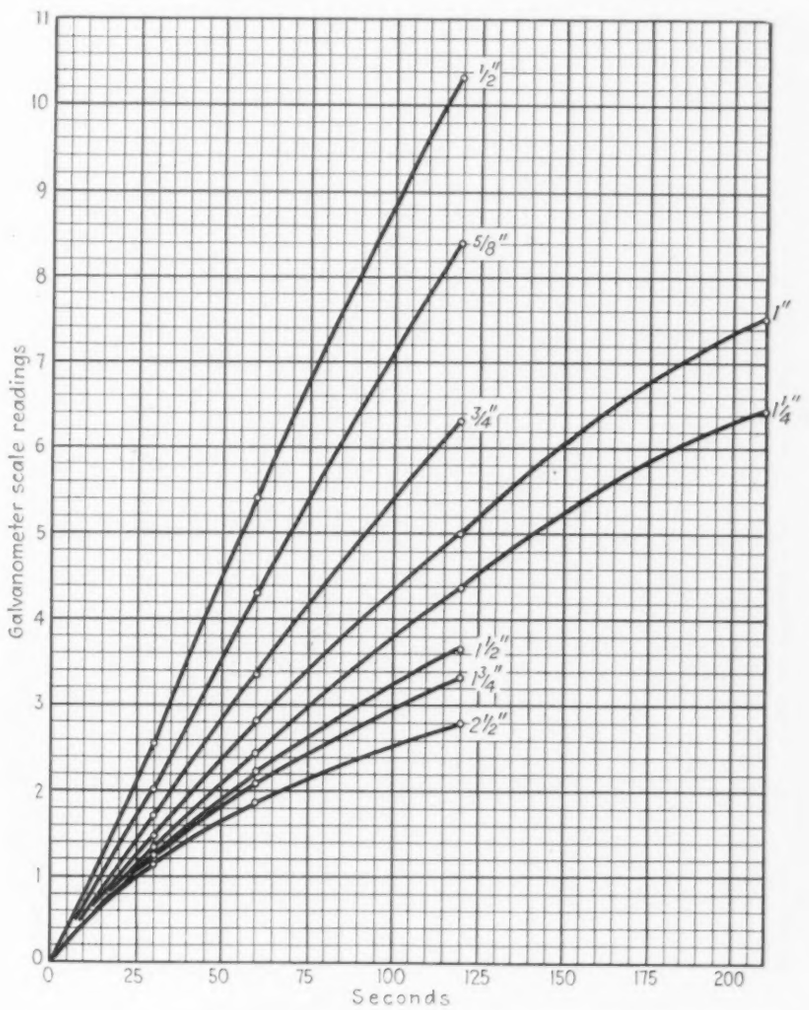


FIG. 2—These data are used to show the rise in temperature in various amounts of time on different thicknesses of material.

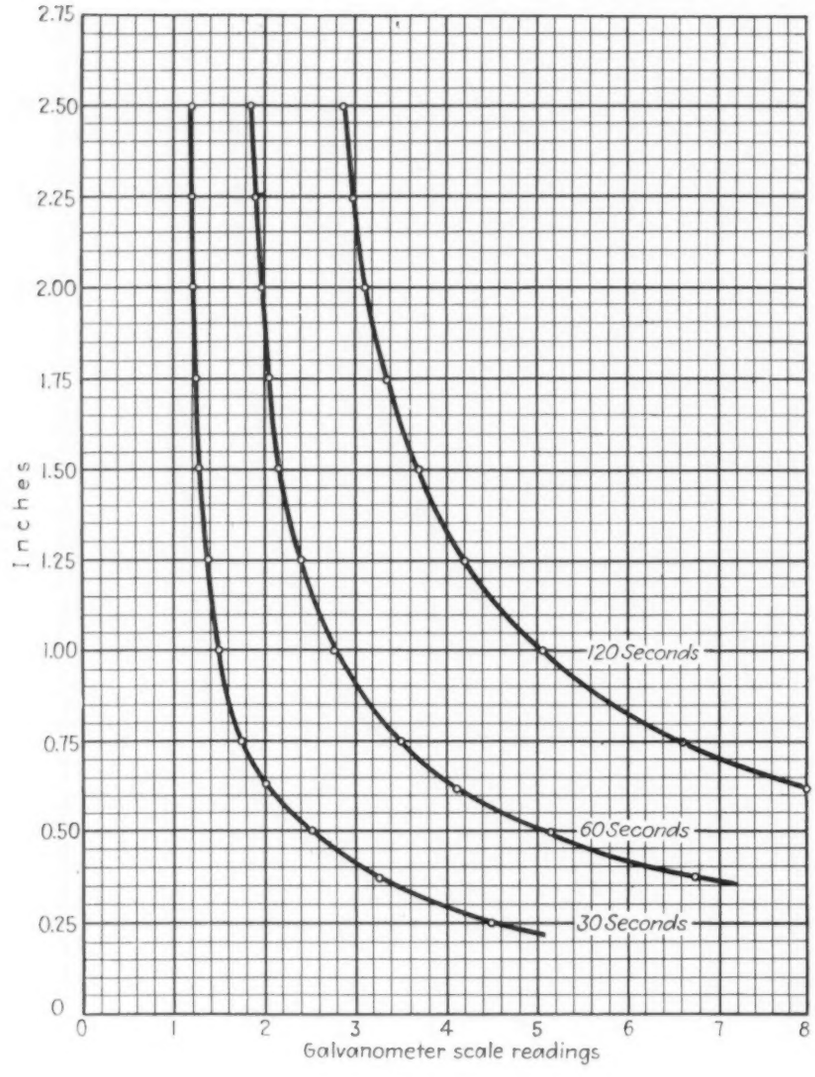


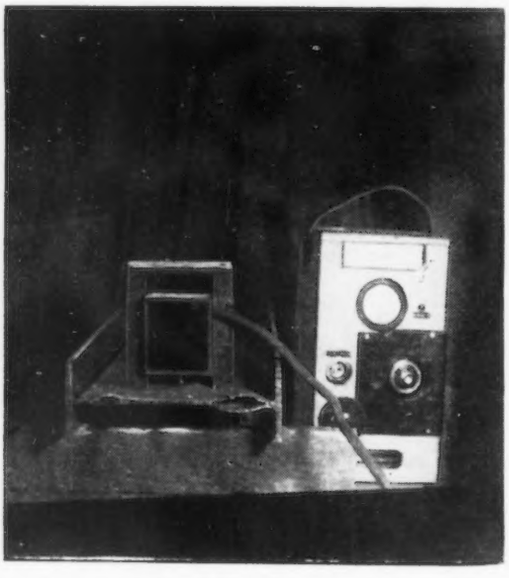
FIG. 3—Galvanometer scale readings on various thicknesses of metal when the device is applied for different lengths of time.

measuring the thickness of a ship's hull plate.

In cases where the plate was backed up by brick work or wood there was no evidence of significant heat transfer from the metal to the backing material.

It has long been known that the rate of heat transfer through a plate containing extensive laminations is far lower than in solid metal. In the case of boiler tubes, the laminations, therefore, lead to local areas of high temperature on the fire side, sometimes even causing blisters on the tube or in tube sheets. This laminated condition is indicated by the test as a locally thin spot. A lamination of this type is shown in Fig. 4. In this case the laminated metal was discovered by other means in an I-beam with ⅜ in. thick web. The laminated spots were opened with a cold chisel in the figure in order to indicate the extent of the area affected. The device can be used on metal of known thickness and would indicate any extended area of laminations.

Fig. 5 shows the instrument in use, the applicator being applied to a boiler drum. The applicator is an a.c. electromagnet for producing the required flux and on which there is mounted a thermocouple. The thermocouple is connected to a reflecting galvanometer. This galvanometer scale at the top of the instrument box is set at zero at the beginning of the test by means of the small handle at the right-hand lower corner of the ground glass window. Below this scale is the round dial of an ammeter indicating the ap-



AT LEFT

FIG. 4—A laminated condition, such as shown here, is indicated in the test as a locally thin spot.

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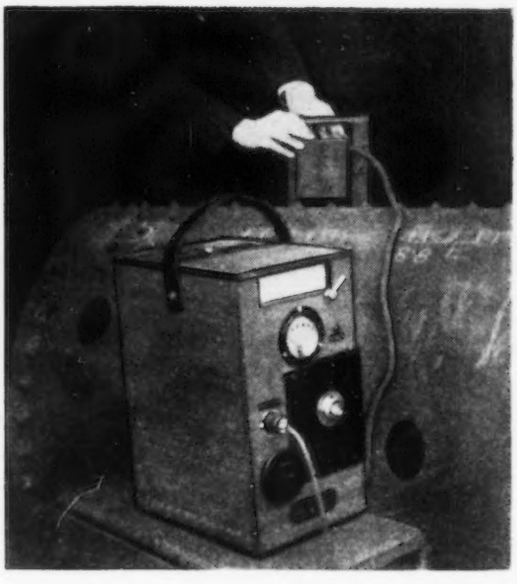
AT RIGHT

FIG. 5—The instrument is shown here in use, the applicator being applied to a boiler drum.



pl.ed current, which is usually adjusted to a standard by means of the rheostat handle on the lower left hand front of the instrument box. The time switch located at the center-right side of panel shuts off the current supply at the end of an accurately measured number of seconds. This timing device is driven by a synchronous motor and is substantially accurate. The instrument case contains space for the test yoke and cable and the entire device is easily portable and operates from a 110 volt, single phase, a.c., power supply. The power required is of the order of a few amperes and easily carried by ordinary electric light cord. Fig. 6 shows the device in use on a group of 48 in. diameter dished boiler heads.

It is felt that this instrument offers a convenient method of field inspection for wall thickness measurements where only one side of the metal is available for test and obviates the necessity of elaborate gaging or the customary method of drilling.

Much of the work reported here has been performed by the Fidelity & Casualty Insurance Co. whose experience and cooperation in the use of the method during the past year has contributed greatly in proving its usefulness.

o o o

FIG. 6—The instrument is being used here to test a group of 48 in. diameter dished boiler heads.

o o o

Credit is also acknowledged to the Lukens Steel Co., Joseph T. Ryerson & Son Co. and the O'Brien Equipment Co. for their cooperation in supplying objects and material for test.

Magnesium, Magnesite and Dolomite

THE latest of the numerous mineral monographs issued by the Imperial Institute, South Kensington, S.W.7, England, deals with magnesium, magnesite and dolomite. It is a work of 126 pages which not only covers all aspects of the magnesium metal industry and the other industries in which magnesite and dolomite play an important part, but also reviews the world resources of magnesium minerals of economic importance, particularly magnesite. Although special emphasis is laid on Empire deposits those in foreign countries are by no means neglected, 29 countries in all being dealt with. In addition to descriptions of the deposits, chemical analyses and tables of production and trade statistics are included where possible. The monograph concludes with a selected list of references to technical literature.

The book includes a brief historical review of the rise of the magnesium industry in the most important producing countries and, although official statistical information regarding production is not always available, estimates are given for probable production in 1938.

The monograph also includes sections on dolomite and naturally occurring magnesium salts, the uses for which these are particularly adapted being described.

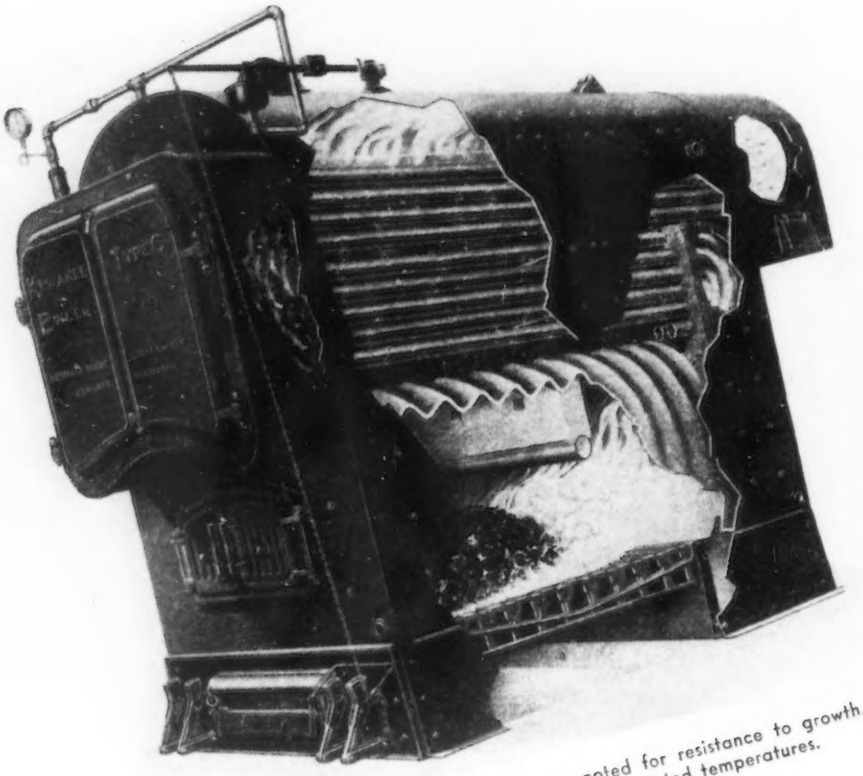
Among Empire resources of magnesite there are extensive deposits in India while the mineral is worked to a less extent in the Union of South Africa and Australia. Canada possesses large reserves of magnesitic dolomite. The principal foreign deposits are located in Germany (Austria), Greece, the United States, the U.S.S.R. and Manchuria. Dolomite, which, in addition to its other uses has recently been employed for the manufacture of magnesium metal, is of widespread occurrence and the United Kingdom is well supplied with domestic reserves.

"Magnesium, Magnesite, and Dolomite" should prove of considerable value to those specially interested in light metals or refractories, and the general reader will find in it much of interest regarding the development of magnesium as a raw material of industry.

British Metallurgist Specifies Ideal Rail

LECTURING before the British Permanent Way Institution recently, T. H. Turner, chief chemist and metallurgist of the London & North Eastern Railway, said that he considered the ideal rail to be one of medium carbon, medium manganese composition, which has been subjected to heat treatment, suitable heat treatment making unnecessary the use of alloying elements.

In advocating the welding of rails into the longest practicable lengths, Mr. Turner gave preference to the flash butt method, which, he stated, gave a structure throughout the zone of the weld more uniform than that given by other processes. When discussing the building up of worn noses and wing rails, he said he preferred the addition of alloy steel by oxy-acetylene heating and hammering to electric welding, as the extra heat and lower temperature of the former process helped to eliminate internal stress resulting from rapid cooling, and hammering tended to solidify the deposit.



NICKEL-CHROMIUM cast iron grate bars, noted for resistance to growth, warpage and scaling when exposed to elevated temperatures.

Nickel

o o o

By ADOLPH BREGMAN
Consulting Engineer, New York

o o o

SIXTH of a series of articles dealing with "The Right Metal in the Right Place", designed to aid the manufacturer in selecting the most suitable non-ferrous metal or alloy for his product.

o o o

SOME metals, as for instance iron, are visibly apparent on all sides. Other metals are severely limited to highly selective applications. Still others are dotted throughout industrial and consumer products, often hidden from sight but indispensable nevertheless.

Nickel, however, belongs in all categories. It has uses which make it stand out in the sight of the industry and the layman alike, and it also exists, hidden, cloaked or "disguised" in a thousand different alloy forms and applications.

Although nickel was not isolated and recognized as an element until 1751, it had been used for thousands of years, first in the form of fragments of meteorites, an alloy of iron and about 5 to 15 per cent nickel. The Chinese produced a nickel-copper-zinc alloy (now called nickel-silver) which they named "pack-tong." And the recent history of nickel is one of the most interesting metallurgical stories in all industry. Only a comparatively few years ago nickel's commercial life depended largely upon armaments (in nickel steel), coinage and nickel-silver. Today, all of these markets could be lost and nickel would still be one of the great, important industrial materials. The expansion in the number of uses for nickel, which grew out of a definite program of research, has resulted in the development of about 75 different types of alloys.

The relative importance of alloy groups as a consumer of nickel for 1938 has been pointed out by R. C. Stanley, of the International Nickel Co. The constructional steels, stainless and heat resisting alloys, and steel castings accounted for 60 per cent of the year's output of nickel; nickel-copper alloys and nickel-silvers took 14 per cent; monel metal, malleable nickel, nickel-clad steels and Inconel took 9 per cent; about 6 per cent was electrodeposited; and the remainder of the output was scattered among numerous other outlets, as for instance the chemical industry and various other non-ferrous alloys. Practically every capital goods enterprise and many consumer products are dependent on nickel in some manner.

What are the properties of nickel which make it useful over almost the whole compass of industry? In the briefest possible form, they are: High strength, resistance to wear, resistance to oxidation and corrosion, unusual magnetic and electrical properties, and attractive natural color.

The extraordinary feature of nickel is its dual type of usefulness, (1) as a pure metal and (2) as an alloy constituent in combination with a host of others, in percentages ranging from 0.5 up to 80. To cite a few examples, in pure form it is used for its appearance, and corrosion and wear resistance; with steel and wrought iron, it is used for the added strength which it imparts; with cast iron, for the

[1] The use of the term "malleable nickel" arose from the fact that originally, nickel was known to be a "refractory" metal, difficult to fabricate. This fault, due to the presence of nickel sulphide (Ni_3S_2) was overcome by the addition of a small amount of magnesium which reduced the brittle nickel sulphide to the malleable and harmless magnesium sulphide (MgS). Today a nickel anode bar is produced which is free from sulphur, and is perfectly amenable to hot forging and rolling without the use of addition agents.

hardness, wear resistance and machineability which it gives; with the brass foundry alloys for the good casting properties which it develops in these alloys; with iron and chromium for its electrical and magnetic properties.

Perhaps the fundamental reason for its breadth of usefulness is the fact that nickel is constitutionally "a good mixer." It dissolves, even in the solid state, in other metals in considerable proportions. With iron and copper, it forms solid solutions in all proportions.

Uses of Pure Nickel

Nickel is obtainable in a high degree of purity. Strip is rolled directly is used in chemical manufacturing equipment as solid and nickel-clad steel for resistance to caustic soda; for plates, grids, screens and cathodes in radio, where its low vapor pressure at high temperatures permits it to be readily freed of absorbed gas; for coinage and in many special applications for its retention of its physical properties at high temperatures and its ready fabricability.

Only recently a new, almost pure nickel was announced (actually, a heat-treatable alloy with 98 to 99 per cent nickel) with the corrosion resisting properties of pure nickel and the strength of alloy steel—up to 240,000 lb. per sq. in. tensile strength.

Pure nickel, therefore, is suitable shafting and gears of machine tools; crushing and excavating machinery.

That nickel plays an indispensable role in the stainless steels, being used to the extent of 8 per cent to 10 per cent with varying percentages of chromium, is too well known to need more than simple mention.

No discussion of nickel is complete without reference to the almost revolutionary change which it has effected in cast iron. The addition of small percentages of nickel to cast iron so improved its strength, hardness, wear, abrasion and corrosion resistance, that engineering and industry took a renewed interest in foundry iron. Those who have been engaged in the cast iron industry for

for Strength and Corrosion Resistance

from the electrolytic cathode, thus supplying in commercial production a metal 99.95 per cent pure.

As pure nickel, it is perhaps best known to the general public in the form of nickel plate to protect steel, brass and die castings from rust and corrosion. The advent of chromium plate, contrary to the predictions of many prophets, did not eliminate nickel, but rather increased its use because it was found that a substantial, heavy nickel undercoating was practically necessary to afford maximum protection.

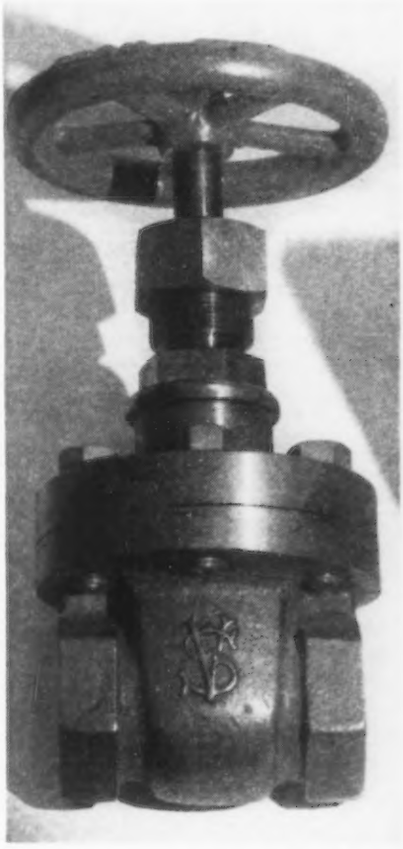
An important present-day trend is the growing interest in nickel plate for industrial rather than decorative purposes. Heavy plates have been produced which have physical properties comparable with cast and fabricated nickel, and which are consequently suitable for engineering uses. These uses include protection against severe corrosion, protection against severe wear, "building up" for salvaging worn-out or mis-machined parts and the direct manufacture of parts by electrodeposition. The latest example of the last named is nickel screen, made entirely by electroplating, although electrotypes and phonograph master and stamping plates have long been made by this method.

The other form of pure nickel (sometimes called "malleable" nickel) for work which calls for resistance to wear and to chemical or atmospheric corrosion. It can be used in the form of solid, clad or plated products.

Nickel Steel and Iron

The greatest single field for nickel in alloy form is in the steels: In structural nickel alloy steels, in nickel steel castings, in stainless steels and in ferro-nickel alloys. One of the earliest alloying agents for steel, nickel is still one of the principal elements so used. Its function is to raise the tensile strength, yield point, elongation and impact strength—in other words, to make the steel stronger and tougher. It is an almost indispensable constituent in such parts as heavy-section forgings or castings that must be heat-treated to very high specifications.

Nickel alloy steels are widely used for carburizing purposes as they permit the development of full hardness in the high carbon content surface layer together with adequate strength and toughness in the low carbon content core. Representative applications of nickel steel include gears, shafts, roller bearings, bolts, nuts and various forgings, crank pins and boiler plate; automotive parts; power transmission parts for aircraft engines; structural elements in long span suspension bridges; power production equipment;



HIGH pressure bronze valve manufactured by the Scott Valve Mfg. Co., Detroit. Composition is a modification of 88-10-2 bronze by replacement of 3½ per cent tin by an equivalent amount of nickel.

the past few years know best how important a stimulus nickel has been to their field.

Nickel is also effective in improving the physical properties of wrought iron, in which it raises the strength and fatigue resistance. An important use for wrought iron containing nickel is in oil-well sucker rods.

A ferro-nickel alloy, Invar (Ni 36, Fe balance) is best known for its low thermal expansion between —60 deg. and about 400 deg. F., the principal application being the low expansion side of thermostatic bi-metal. Another important application based on this property is as a part of the construction of light aluminum alloy automotive engine pistons, in order partially to neutralize the excessive thermal expansion of aluminum in comparison with that of the cast iron cylinders into which they fit. Other uses include clock, watch and chronometer parts, surveyor's tapes and length standards.

By the addition of a few per cent of chromium to Invar another alloy, Elinvar, is produced which has a practically constant modulus of elasticity over a considerable temperature range, a property which makes it eminently useful for springs in precision instruments, like hair springs in watches.

Non-Ferrous Alloys

Although its largest field of usefulness is in steel, nickel, in one form or another, is an integral part of a large and growing number of non-ferrous alloys. The oldest examples are the nickel-silvers, the copper-nickel-zinc group, generally carrying up to 18 or 20 per cent nickel, best known for their use in plated tableware and flatware. Coinage metal, another standard outlet, contains 25 per cent nickel, balance copper. But substantial percentages of nickel are needed in some industrial as well as consumer products. Condenser tubes for marine service (Cu 70, Ni 29 to 30, sometimes tin and rarely about 1 per cent Mn) have been in service long enough to prove their high resistance to salt water corrosion, freedom from pitting and perforation, and their excellent anti-fouling characteristics.

Any discussion of nickel in non-ferrous metals must include monel metal, the "natural" alloy containing about 67 per cent nickel with about 1½ per cent iron and small amounts of manganese, silicon and carbon, and the balance copper. Due to its high strength and unusual resistance to corrosion by a variety of chemicals, monel has found dozens of applications during the past 20 years in chemical equipment, in power engineering (for turbine blading and valves, for example), in steel plants for pickling equipment, in laundry and dyeing machines, in food-handling equipment in hotel, restaurant and home kitchens, and in hospital equipment.

A modern development in monel has resulted in the production of this alloy in a number of different modifications differing from each other in specific points, such as machineability, strength, softness or ductility. Special properties can be produced by these variations to provide a material for special functions.

An important service for nickel in non-ferrous alloys has been found as a small percentage addition agent to improve the casting properties of a variety of mixtures. It has been put to excellent service as an age-hardening constituent in aluminum-nickel-copper, copper-tin bronzes and copper-nickel-silicon, using from 3 to 10 per cent nickel. Nickel and copper can be hardened by beryllium to achieve extraordinary hardness, from 400 to 500 Brinell, by proper heat treatment.

For electrical resistance purposes, the nickel alloys are a prime necessity. For ordinary temperatures the most generally used are Constantan, a copper-nickel alloy with 40 to 45 per cent Ni, 1 to 3 per cent Mn and up to 1 per cent iron, and Manganin, 84 to 86 per cent Cu, 4 to 12 per cent Mn, and 2 to 12 per cent Ni. Chromel and Nichrome with 65 to 85 per cent of Ni and 15 to 20 per cent Cr and in some cases, iron, are more recent developments for work in which the heating elements are kept red hot for long periods.

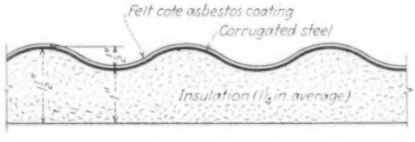
Ferro-nickel alloys with 20 to 30 per cent of nickel are non-magnetic. This property makes them advantageous in electric motor and generator construction for such parts as end plates and retaining rings, in which the alloy usually contains chromium and manganese as well as nickel.

Communication apparatus requires high magnetic permeability in low magnetic fields. It was found that the 78.5 per cent nickel-balance iron alloy, heat treated, has a permeability about ten times as high as commercial iron or silicon iron. This alloy known as Permalloy found immediate use as the winding around the conductors of transatlantic submarine cable and effected a five-fold increase in the rate of transmitting cable signals.

An improvement was recently effected in permanent magnets by the use of an alloy steel containing 20 Ni, 15 Al, 5 Co, which has higher values of magnetic energy than have been previously available on a production basis.

Insulated Roofing and Siding Material

APMI (Asbestos Protected Metal, Insulated) is a new corrugated roofing and siding material recently developed by the American Steel Band Co., Bowman Building, Pittsburgh. As the accompanying illustration



shows, a rigid type of insulation similar to wallboard is bonded to the under side of the corrugated steel, with the flat surface presented to the interior and the curved surface exposed to the weather. Three thicknesses of insulation are available, averaging ¾, 1¼ and 1¾ in., having corresponding heat transmission factors of 0.32, 0.215 and 0.145 B.t.u. per sq. ft. per deg. F. The corrugated material is furnished in 24, 22, 20 and 18 gage.

The outer surface is ordinarily covered with black Felt Cote asbestos, but for architectural effect, APMI is available in maroon or other color. The interior can be furnished painted, including aluminum paint, and for excessively damp locations, a Vapor Seal surface treatment can be applied at the factory. Fireproofing paints, such as Rice Powdrpaint (a casein product) can also be used on the insulation face, or it can be painted in any color by ordinary methods after installation. Gypsum plasters, magnesites and other inerts may be applied to the facing also.

IRON

99.99 Per Cent Pure

THE world's costliest iron, a metal 99.99 per cent pure, is being made at the research laboratories of the Westinghouse Electric & Mfg Co., under the direction of Dr. T. D. Yensen, manager of the magnetic division. Although the world's consumption of this iron does not exceed 1000 lb. a year, chemists and metallurgists in the laboratories find it of vital importance, for its spectrum makes available nature's scale of the metals. By comparing spectrograms of samples with the pure iron standard, investigators are now able to analyze all metallic elements.

Spectrograms actually result from a modified form of "atom smashing". When an electric current is passed between two pieces of pure iron, forming the electrodes of a spectrograph apparatus, the electrons in the metal atoms are excited, bombard one another, and give off radiation. This radiation, when focused through a prism of the spectrograph, is recorded as lines on a photographic plate.

An iron atom has 26 electrons, negatively charged particles revolving about the central core or nucleus of the atom. When excited, each electron can jump from its normal position into any other position in the atom, and each jump corresponds to certain lines on the resultant spectrogram. Every line produced by an electron in an iron atom will be characteristic of iron, as the arrangement of the electrons is different for every element.

Even in the ultra-pure spectrographic iron there are slight traces of many other elements. During the atomic bombardment, the electrons of these elements also give off radiation in their own peculiar wave lengths, and some of these are strong enough to record faint lines on the spectrogram. Comparison of the spectrogram of a test metal with the pure iron standard provides the investigator with a measurement of the wave lengths of all metallic elements in the test piece.

Making of Pure Iron

For the past 10 years, ever since Dr. Yensen and his associates succeeded in removing all but a few hundredths of one per cent of the metal's impurities, Westinghouse has supplied much of the world's needs of spectrographically pure iron, through distribution channels of optical manufacturers.

A raw material already low in copper, nickel, and cobalt content is used as one of two electrodes in an electrolysis process. When an electric current is introduced into a chemical solution of iron salts, the iron molecules travel through the solution to the second electrode, made of lead. Except for about 0.01 per cent of carbon, the other impurities in the iron are left on the first electrode.

The resultant porous mass of iron is heated at high temperature in a hydrogen atmosphere to remove the oxides formed during transfer and storage. Next, the iron is placed in a high-frequency induction furnace to remove the remaining carbon and oxygen. By a special annealing process Dr. Yensen is now able to refine this iron to a carbon content of only 0.001 per cent.

All this concern over carbon is due to its effect on the lattice structure of iron crystals. In crystals of pure iron the atoms form a lattice arranged with one atom at each corner of a cube and one atom in the center of the cube. If a carbon atom occupies a space between the other atoms, it distorts the lattice. As the desirable physical properties of the iron depend on the regularity of the lattice structure, the addition of one or more carbon atoms upsets the balance and is undesirable.

It is the job of the high-frequency induction furnace to keep out these unwanted atomic visitors. Inside a vacuum chamber, as seen in the accompanying illustration, the furnace consists essentially of a coil of hollow copper tubing through which cold water flows, a crucible to hold the iron, and a packing of Alundum between the coil and the crucible, as heat insulation and support for the crucible. Current at 10,000 cycles is passed through the tubing and builds up a temperature as high as 3000 deg. Carbon and oxygen in the iron combine during the heating and are drawn off by the vacuum system as carbon monoxide.

The result is an iron purer than nature has ever made. But, despite its purity this iron is still a complex mixture of 27 elements as follows: Silicon, less than 0.01 per cent; oxygen, less than 0.01; carbon, less than 0.005; sulphur, less than 0.005; nitrogen, less than 0.004; phosphorus, less than 0.003; manganese, less than 0.003; zinc, less than 0.002; molybdenum, less than 0.001; copper, less than 0.001; lead, less than 0.0004; tin, less than 0.0002; barium, less than 0.0001; titanium, less than 0.0001; silver, aluminum, arsenic, boron, calcium, cobalt, chromium, gallium, iridium, magnesium, nickel, vanadium, and tungsten, slight traces, but each less than 0.00005 per cent.

By means of the Yensen research procedure Westinghouse can produce a year's supply of the metal in less than a week. The iron is now cast in 200-lb. ingots, so soft that they can be pounded into billets at the low forging temperature of about 1600 deg. F. The billets are then rolled into long rods ¼ in. or ⅜ in. in diameter. To eliminate surface oxidation they are again heated in a hydrogen atmosphere at a temperature of more than 2000 deg. and held at this temperature for 24 hr. before cooling. The finished rods then travel to all quarters of the globe, to serve as laboratory standards.

Unit Trolleys and Continuous Drives on Overhead Conveyors

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By FRANCIS JURASCHEK

CHAPTER 35 of a Series of the Methods and Equipment of Materials Handling.

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IN general, there are two types of overhead conveyors in widespread use in American industry, differentiated only by the method of moving the suspended loads. Both types employ a monorail track suspended overhead by a supporting structure; both types likewise employ trolleys running upon that track and supporting, in turn, any one of a great variety of load carrying devices. The feature which makes the one type differ from the other type is the fact that in the one each trolley is an independent unit, capable of being moved or of remaining at rest in any particular location without regard to the state of motion or inaction of any other trolley in the system; while in the other all the trolleys are tied together at regular intervals by a continuous chain which, when power is applied to it, causes all the trolleys of the system to move in one direction simultaneously. For convenience the one type may be designated as the "unit trolley system" and the other the "continuous drive system" of overhead conveyor.

At first glance there would seem to be no special functional difference between the two systems. Both utilize the primary advantage of the overhead conveyor—they remove handling from the working floor of a plant, thus conserving valuable space. Both likewise embody the fundamental principles of all mechanical handling equipment—they reduce the time and effort required to move goods from one point to another. But here the common factors end, and a divergence of method and of use enters. Functionally, that divergence may be expressed most readily in the difference between two words: *intermittent*, and *continuous* moving.

A brief analysis of certain handling situations will make this difference clear. If the handling conditions are such that goods must be moved from point to point at irregular intervals of time, or held at a particular point during transit, or the path of travel is not along a single line but is split to serve a number of intermediate or final destinations, or when the goods must retrace part of their travel at irregular intervals between the starting and ending points of the conveyor travel, then in all these cases, the unit trolley type of overhead conveyor meets the conditions of service best. On the other hand, if the handling conditions are such that a continuous movement of goods in one direction, over a single line of travel, will meet the required conditions of service, the continuous drive type of overhead conveyor will operate most advantageously.

Normally it will be found that the continuous drive type of conveyor is more largely applicable under circumstances where mass production principles of operation may be applied successfully, and the unit trolley type where the work varies in character, or where plant layouts are not conducive to straight-line flow methods, or where the volume of production varies to a marked extent from day to day. These statements must be considered general only, and not taken as hard-and-fast rules; for at times the conditions of service permit a large

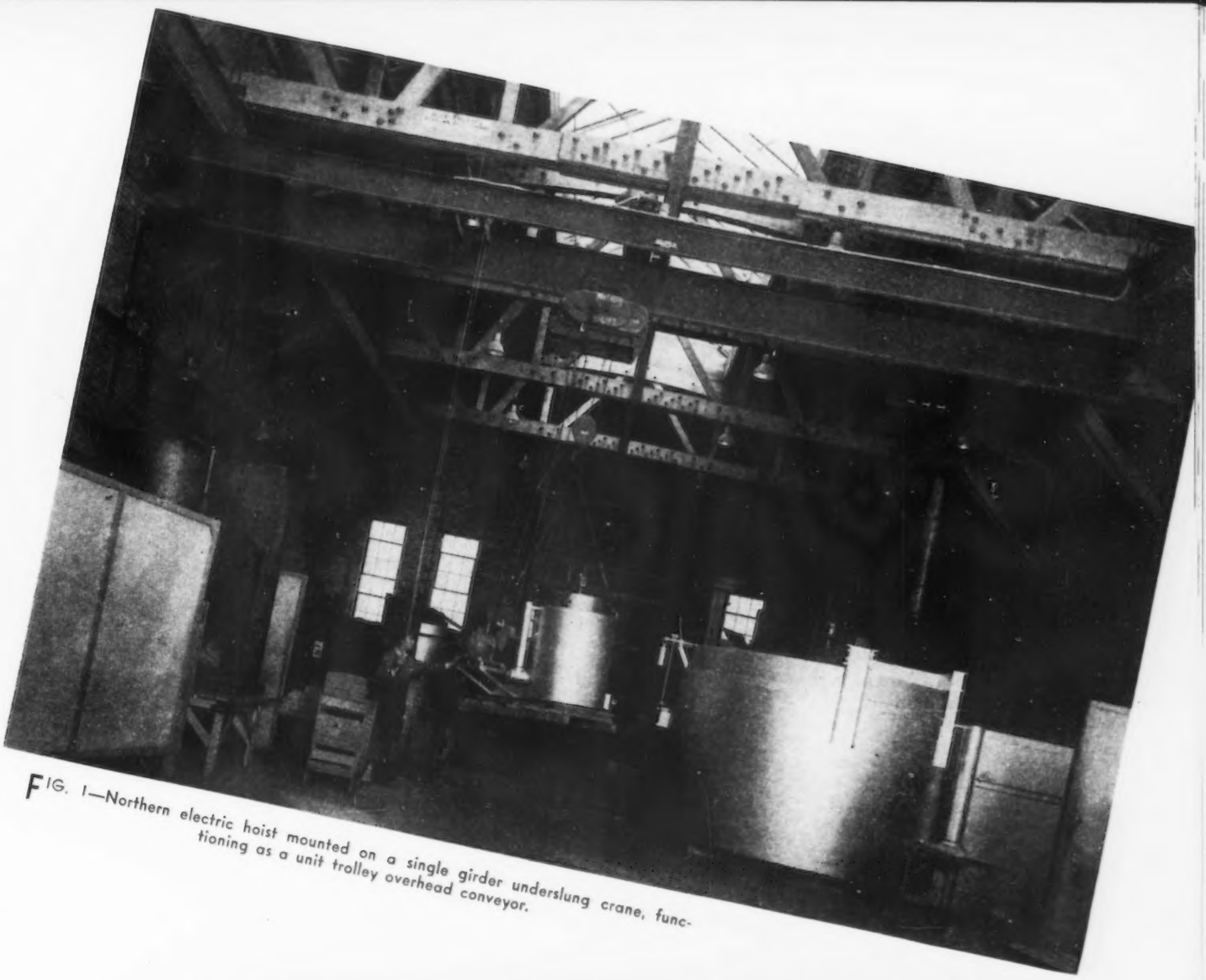

FIG. 1—Northern electric hoist mounted on a single girder underslung crane, functioning as a unit trolley overhead conveyor.

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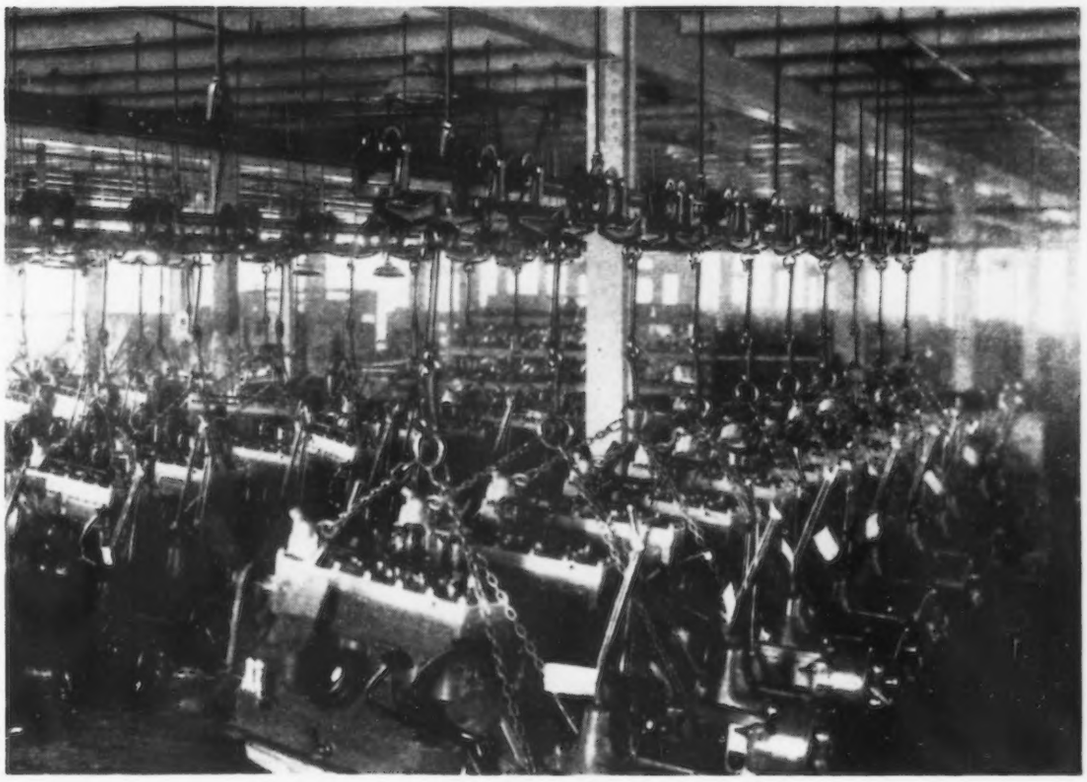

FIG. 2—American Monorail unit trolley system in a motor manufacturing plant, laid out to serve as a motor storage room.

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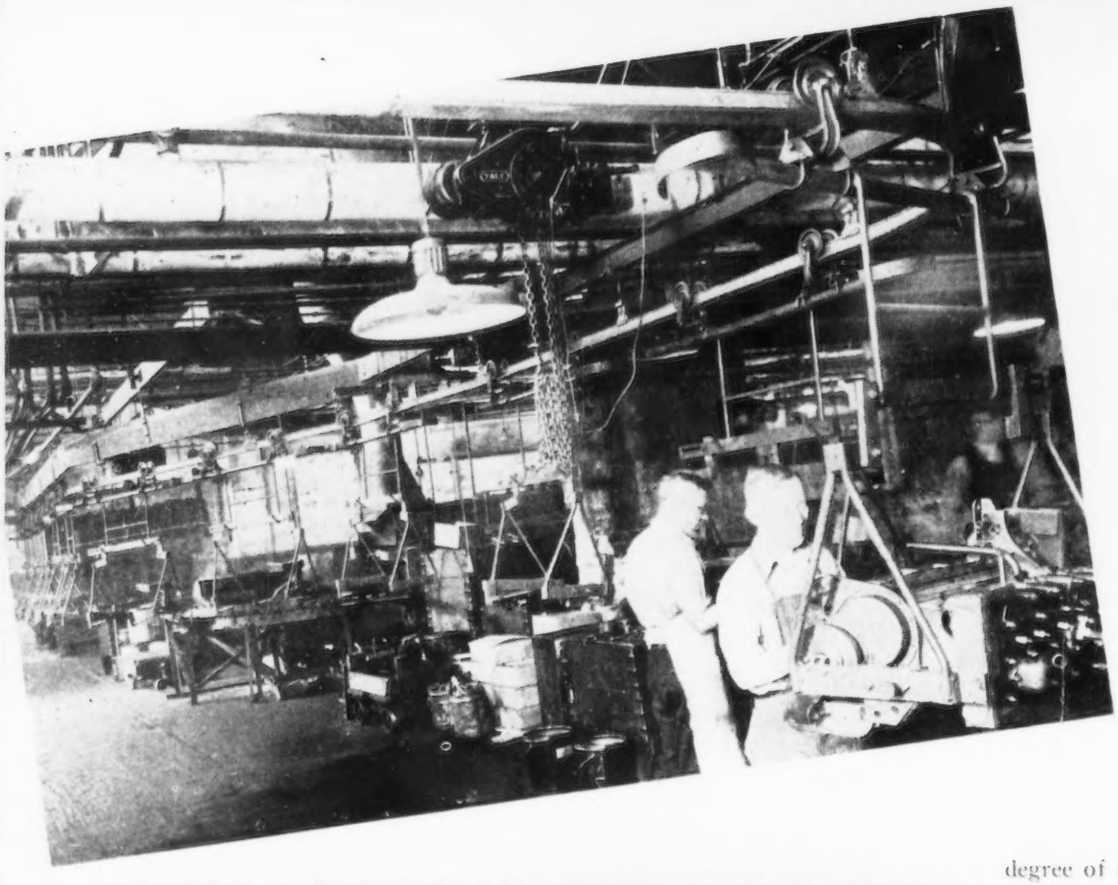

FIG. 3—Cleveland Tramrail unit trolley system, permitting the flow of work to be stopped at irregular intervals at various work stations.

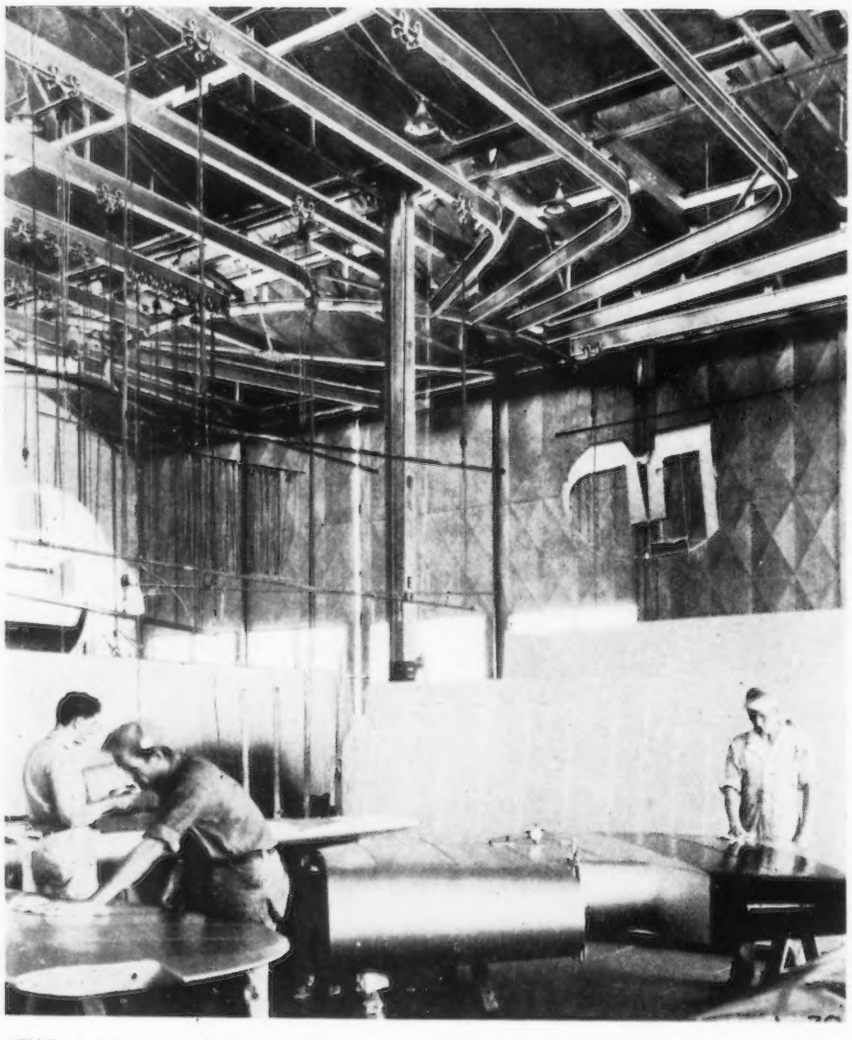

FIG. 4—American Monorail unit trolley installation in an aircraft plant, with ten lines of track converging on a common transfer point.

degree of latitude of choice as to the specific equipment used.

Within this latitude of choice certain basic mechanical handling principles hold just as true as anywhere in the whole field of materials handling. As a basis for these principles, consider the following statement:

"Every installation of materials handling equipment is successful and profitable only because it eliminates the rehandling of goods, or because it permits the handling of larger quantities of goods with the same or a lesser amount of physical effort, at the same or lower costs."

From this statement two basic principles may be deduced:

(1) A successful installation of mechanical handling equipment picks up a load wherever that load may be located, and carries it through to its destination without rehandling.

(2) A successful installation of mechanical handling equipment permits an economical increase either in the size of the unit of production, or in the size of the unit load handled, or both.

Unit Trolley Installations

These two basic principles are admirably illustrated in the accompanying pictures, which likewise show clearly the distinction between the two sets of conditions usually governing the use of the unit trolley type and the continuous drive type of overhead conveyors.

Fig. 1 illustrates an important step in the development of the overhead

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FIG. 5 — Alvey - Ferguson continuous drive overhead conveyor carrying fire extinguishers from spray booths through a Gehnrich drying oven.

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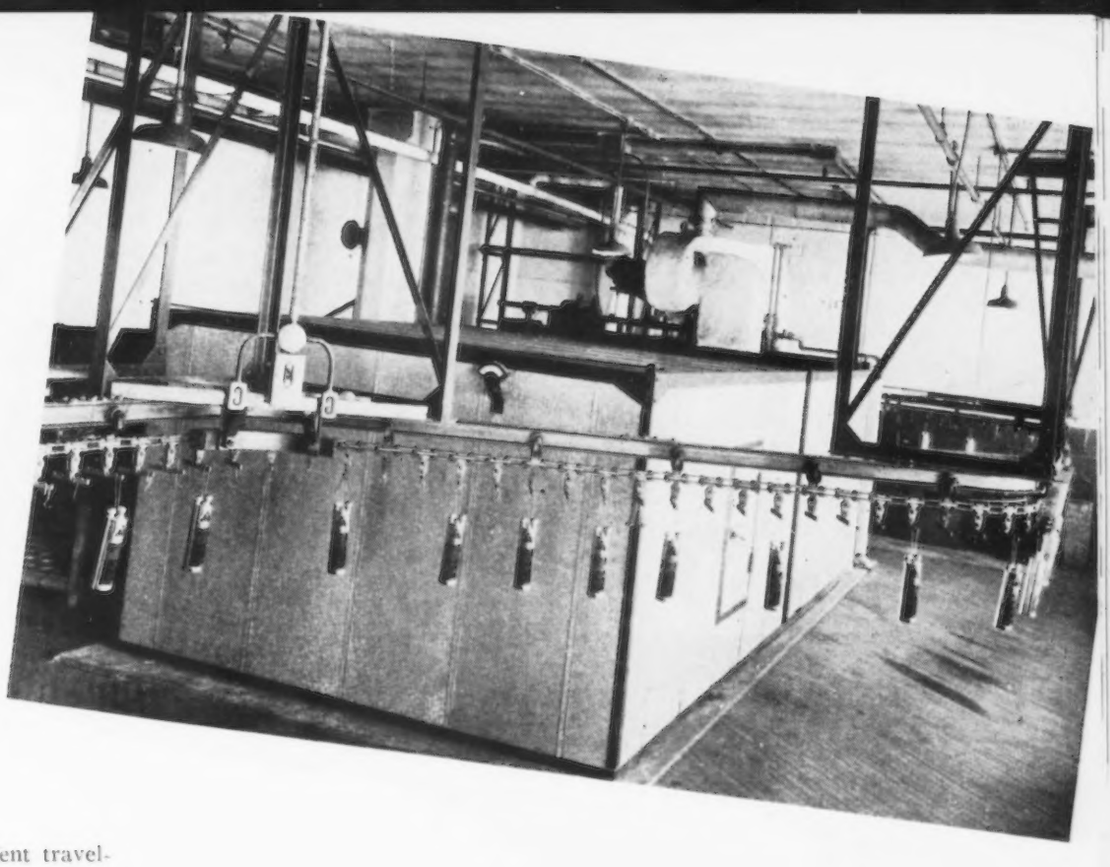


conveyor from the antecedent traveling crane. Here in an engineering construction shop a 5-ton capacity single girder underslung crane is equipped with a Northern single motor electric hoist, to serve a restricted area of the assembly shop. The interesting fact about this installation is the adaptation of the crane to the monorail conception of trolley runway for the hoist. Here the track section is very short, and simply spans (as traveling cranes do) the width of the working area, but permits the handling of relatively large unit loads speedily and with ease.

Now, when the monorail track, instead of moving bodily in a longitudinal direction, is itself fixed as a longitudinal run, we see the evolution of the overhead conveyor proper. This is shown in Fig. 2, an installation of American Monorail conveyors in an automotive plant. This is a view of the motor storage room in which, pending the assembly of each motor in its corresponding chassis, the motors are stored, suspended in the air. Note this important fact: The motors are suspended by hooks and in chain slings from tandem unit trolleys in the machine shop, immediately after the final motor inspection. They are then pushed by hand into the adjoining motor storage room, and, as required, from this room to the adjoining assembly line—all without any rehandling. This photograph also illustrates admirably the use of the overhead track as a reserve storage facility.

In another motor plant the Cleve-

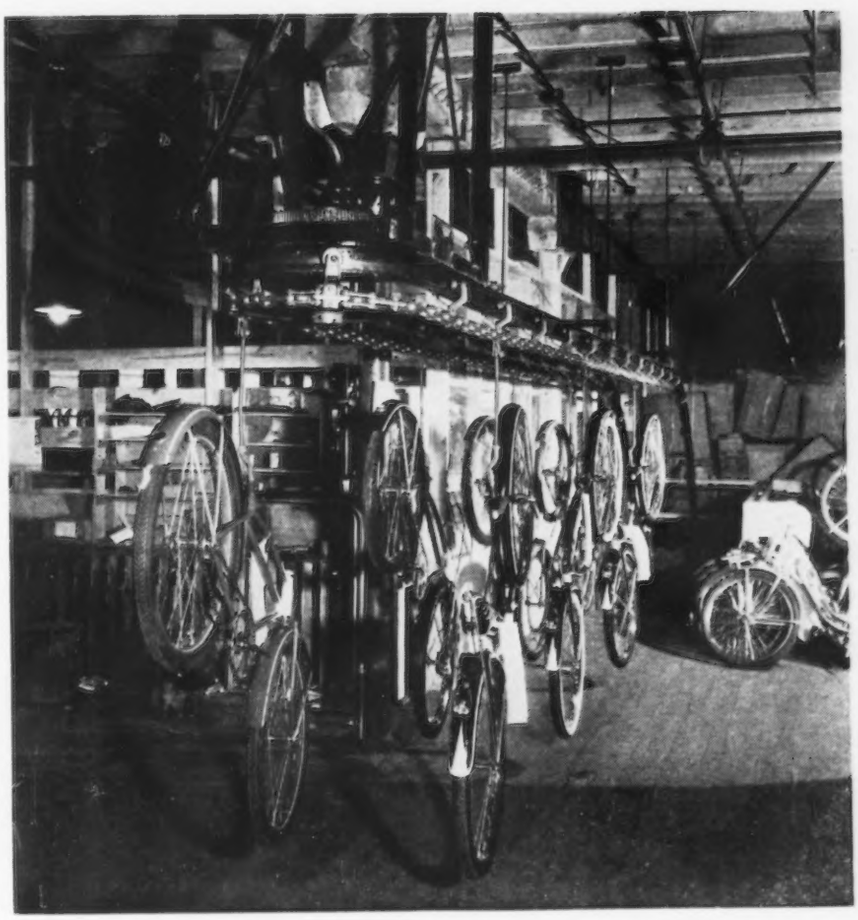


FIG. 6—Link-Belt continuous drive overhead conveyor bringing assembled bicycles from floor below to the shipping department.

land Tramrail installation shown in Fig. 3 marks another step in the evolution of the continuous drive type of overhead conveyor. Here, as the motors pass through a final motor-assembly department, we find the line of trolleys advancing always in one direction and in regular order. The only factor here that militates against continuous drive is the necessity of holding each trolley load for varying periods of time at each work station. Because of this fact, a steady, continuous movement of the loads is not feasible. But, on the other hand, consider the ease with which each motor is handled, the size and weight of each load, and the possibility of holding the load at any point in its travels as long as may be required to finish the work unhurriedly at each particular station. And note also the fixed-position electric hoist situated at a point where the position of the motor in the sling may be reversed, to permit work to be done on the other side of the load.

In Fig. 4 may be found a use for the unit trolley type of overhead conveyor for which the continuous drive system is not at all adapted. Here, in an aircraft plant, 10 lines of monorail track converge on a common transfer point. It will be noticed that, within the semi-circular arc formed by the light member which unites the terminals of all 10 lines of track, a section of monorail track is suspended as a jib-boom crane. This crane section is free to move into position connecting with the end of any of the conveyor track lines; thus a load on any one line may be moved onto the crane section, and the crane section then swung over to make contact with any other line. In this way loads may be transferred readily from line to line. Again, in this particular portion of the shop assembly work is carried on, and parts from other sections of the shop are brought here, fitted to other parts, and the whole assembly moved away to still another location.

It should be noted that the unit trolley type of overhead conveyor is especially adapted for the installation of switch sections, permitting goods to be moved at will to any point within the area served by the entire system, and making the system likewise adapted for the installation of many parallel lines of track to be used for overhead storage.

Continuous Drive Installations

Fig. 5 is an excellent example illustrating the continuous-flow idea which is the foundation of the continuous drive overhead conveyor system. The conveyor equipment is an Alvey-Ferguson installation of single strand drop forged chain suspended by trolleys from an I-beam track. The speed of this chain may be regulated by a Reeves variable speed transmission located at the drive end. Small fire extinguishers are being carried from several spray booths (not shown) where lacquer has been applied, around the side of the Gehnrich drying oven and into the oven (at the back of the picture). In the oven the line makes five counterflow passes, then emerges at the same end and travels back around the far side of the oven, to an unloading point situated near the spray booths. Note that whereas the unit load is small, many loads may be carried by the conveyor in regular order, and that the conveyor moves continuously forward at a rate of speed that is governed by the conditions of drying in the oven.

The continuous drive conveyor system lends itself particularly to movement in other than the horizontal plane. This fact is illustrated in Fig. 6. Here bicycles coming from the final assembly department on a floor

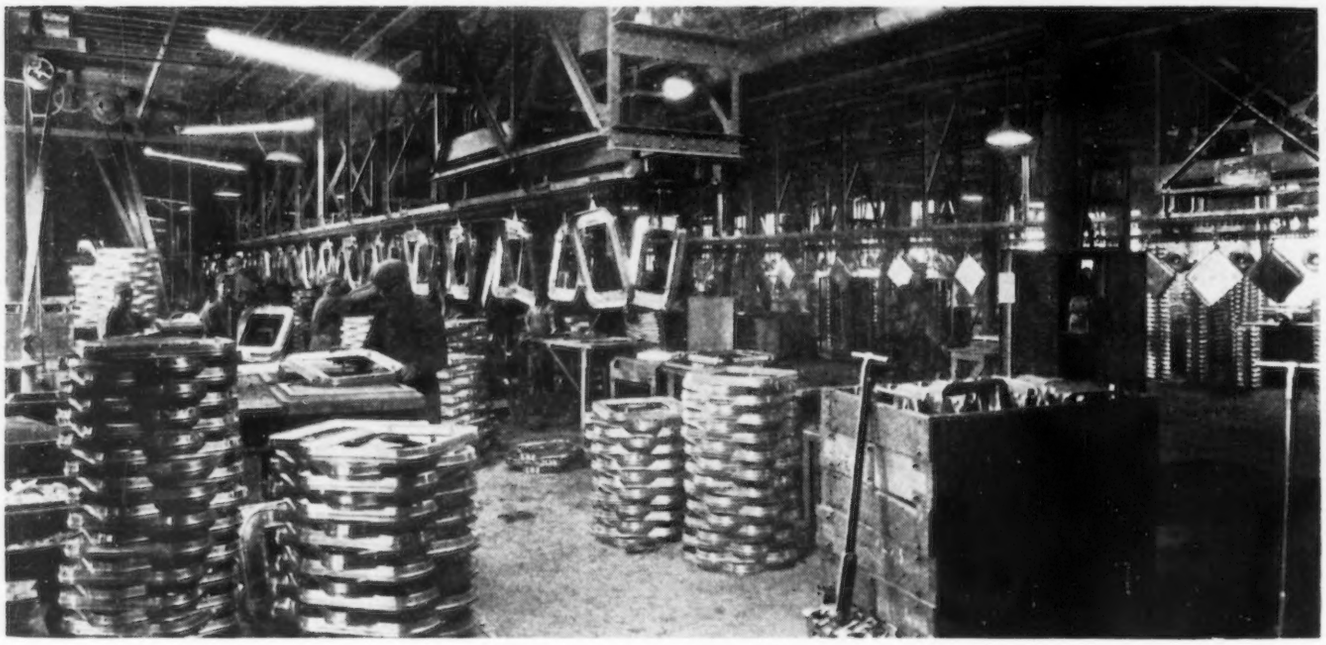


FIG. 7—Chain Belt continuous drive overhead conveyors passing stove parts through various manufacturing operations.

FIG. 8 — Mechanical Handling Systems continuous drive conveyor carrying heavy, bulky motor car bodies to the final assembly line.

below, are carried by the Link-Belt continuous chain overhead conveyor up through the floor opening in the background into the shipping department. Here may be seen also a typical drive end of such a conveyor, a gear pinion on a motor driving a large gear to which is attached the sprocket wheel engaging in the links of the conveyor chain.

The Chain Belt installation shown in Fig. 7 carries stove tops down the line in a stove manufacturing plant, where they are successively inspected, drilled and passed on to the next operation in sequence. A similar line in the right background carries other parts through like operations.

So far the loads carried by continuous drive overhead conveyors as shown have all been relatively light. But heavy loads may be carried by such conveyors with equal facility—and even heavy loads that are bulky and of awkward shape. In Fig. 8 is shown a typical mechanical handling system installed by a firm which specializes in automotive handling. Here a complete motor car body is carried in a special sling hung from two tandem trolleys. Note that the drive chain is suspended by non-load carrying trolleys spaced between the load carrying trolleys. The track may be swung in both vertical and horizontal curves, to meet almost any conceivable condition imposed by the plant layout.

And finally, as shown in Fig. 9, the continuous drive overhead conveyor will take goods not only through manufacturing operations inside the plant, but will also deliver them as easily outside the plant. This is a Mathews Conveyer installation.

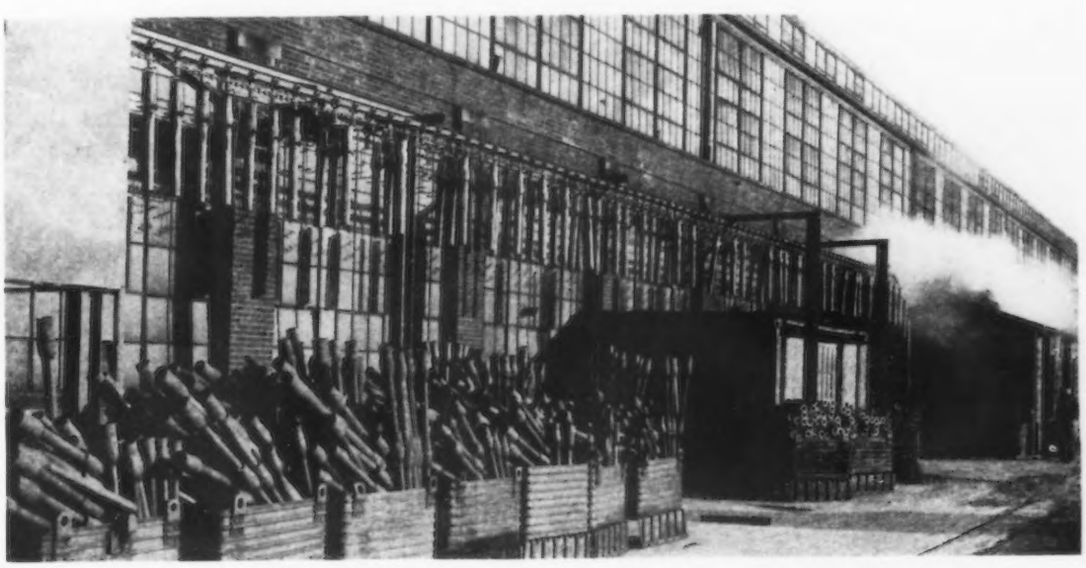


FIG. 9 — Mathews Conveyer continuous drive conveyor passing a steady stream of parts from pickling tanks inside a building to a discharge point outside.

HYDRAULIC ACTUATION EXTENDED

RECENT announcements of the builders indicate that the flexibility of hydraulic power is finding wider application. It is being applied to the feed of an automatic screw machine, to a duplicating lathe of Swiss origin and to all functions of a gear shaver except spindle rotation. Hydraulically actuated surface grinders, unit drilling heads, milling machines and hack sawing machines are also reviewed in this article, as are other general types of machines put on the market in the past month.

HYDRAULIC feed with convenient controls for rapid changeover, making the machine efficient on short runs, is applied to the new No. 1½ Footburt automatic single spindle screw machine, announced by the *Foote-Burt Co.*, Cleveland. Feed of the six-station turret is accomplished by means of a hydraulically driven drum type cam with solid path. Separate feed control for each station is provided by six hydraulic valves with micrometer control knobs conveniently located. Variations in length of feed and shift from rapid traverse to feed and vice versa are governed by the location of trip dogs on a revolving disk, two trips being provided for each station.

Although rated at 1½ in. capacity, the machine will take work up to 1⅝ in. by the use of a solid chuck and shell and is efficient down to ½ in. because of the wide range of spindle speeds for steel or brass work. Full range is 30 to 2000 r.p.m. Automatic speed changes, including two forward and two reverse speeds, are made through hydraulically actuated disk clutches, governed as in the example of the feed, by adjustable trip dogs on a disk.

Stock feed and drum are operated by a drum cam that advances the stock tube and controls the clamping of the collet jaws. Only one screw need be turned to get the full adjustment up to the 14 in. length capacity. Cross slides are fed by a cam disk. The turret is indexed by a Geneva motion, with total idle time only 8 sec. for a full cycle. The turret is arranged so that oil tube drills and reamers may be used with automatic starting and stopping of the coolant flow.

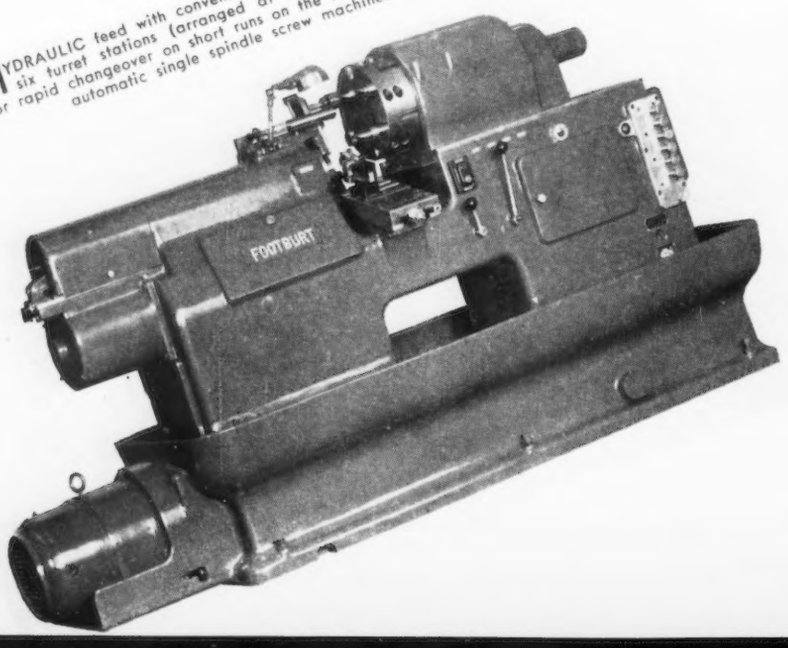
Precision Boring Machine

THE STOKERUNIT CORP., Milwaukee, announces the development of its 200 series Simplex precision boring machine, especially arranged to provide flexibility and versatility in fine boring work. So as to insulate the machine from floor vibration, the bed is mounted on rubber pads, and the spindle driving motors are also rubber mounted to isolate vibration. From one to four spindles may be mounted on each bridge. Drive is by V-belt, from separate motors, with normal speed range from 250 to 3500 r.p.m. Distances between bridges can be adjusted from 19 to 35 in. Table is 13 in. wide by 55 in. long and is screw fed. Feed changes are made through pick-off gears. A solenoid operated reduction gear provides fine feed for facing or heavy boring, and by means of a pneumatic time relay permits facing to a positive stop. Manual movement of the table may be effected by handwheel. Feed range is 16 in. in either direction.

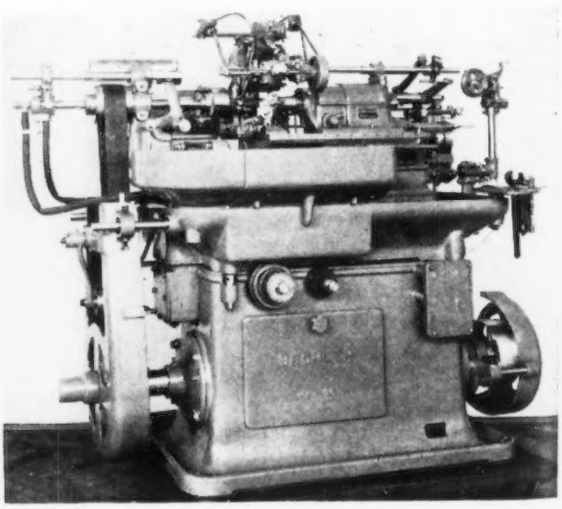
Unit Drilling Head

A SMALL hydraulic feed unit for drilling, reaming, boring, facing, etc., has been announced by the *W. F. & John Barnes Co.*, Rockford, Ill. The SH-75 model is provided with an auxiliary base for direct mounting on existing machine beds. It can be used in combination with other units and mounted vertically, horizontally or at any angle. Requirements of the work determine the design of the spindle

HYDRAULIC feed with convenient controls for each of the six turret stations (arranged at extreme right) makes for rapid changeover on short runs on the Footburt No. 1½ automatic single spindle screw machine.



SERIES BE is a new and larger size of Bechler (Swiss) automatic screw machines, of ½ to ¾-in. capacity. As in the smaller machines, there are four tool slides operated by cams and cranks in a single vertical plane, and the stock travels intermittently past the tools. The headstock spindle, which rotates the bar stock, advances and recedes along a slide and pushes the bar through a fixed bushing located just behind the tools. These machines are sold by the Triplex Machine Tool Corp., 125 Barclay Street, New York.



IN LATEST MACHINE TOOLS . . .

By FRANK J. OLIVER
Associate Editor, The Iron Age

gear box, which is fastened to the flange of the unit, and which is supplied by the user or by the Barnes company. Where lot size and production are low, the unit can be supplied with a single spindle and universal fixture for drilling and boring operations. The unit is designed to accommodate either a 1200 or 1800-r.p.m. motor, with four speeds available for each motor. The hydraulic mechanism consists of a constant delivery rapid traverse pump and a variable delivery feed pump, giving a feed rate up to 10 in. per min.

Hydraulic Gear Finisher

HYDRAULIC operation of the rack table, providing smooth travel and cushioned stroke reversal, and hydraulic cross feed of the head and down feed of the gear have been applied to the new model 900 gear finisher, announced by the *Michigan Tool Co.*, Detroit. It operates on the same crossed-axis shaving method of cutting as the smaller 854 rack type gear finisher. The cross feed is designed to reciprocate the gear across the rack at a constant but adjustable rate of speed and stroke. The hydraulic down feed comprises a rapid approach and a slower feed, adjustable by valve from 0.0005 to 0.0025 in. per table cycle. Automatic stops limit the down feed and a dial setting stops the rack after the desired number of finishing strokes, whereupon the head rapid returns. Trip dogs limit the travel of the rack.

Complete separation of chips and foreign matter from the coolant is assured by a series of six settling tanks and baffles, the next to last compartment being filled with steel wool for final filtering. Improved quality of finish and increased tool life are said to result. A central lubrication system is also provided for automatically oiling all vital parts each time a gear is finished.

Duplicating Lathe

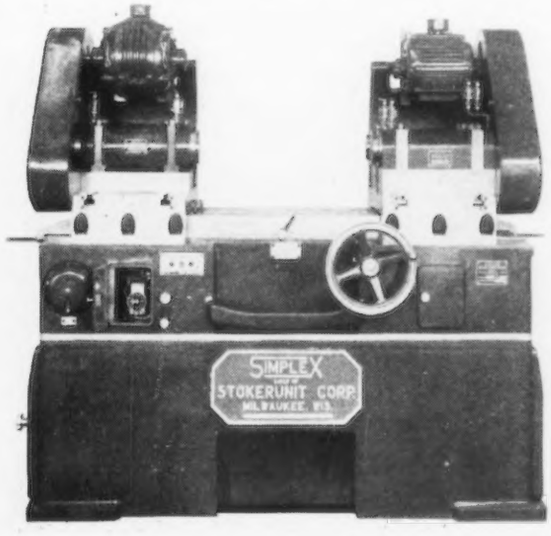
A NEW type of copying lathe for duplicating work of many diameters is being made by the machine tool division of the *George Fischer Steel & Iron Works*, of Schaffhausen, Switzerland, and is being sold in this country by *W. A. Schuyler*, 250 W. 57th Street, New York. In this lathe, the base, column, overarm and outside cylindrical support make a closed, rigid frame, giving the required rigidity for use with cemented carbide tools. For duplicating, a template of mild steel sheet of full scale size is attached to the lower part of the lathe.

AT RIGHT

AN auxiliary base which can be attached directly to existing machine bases is a feature of the Barnes SH-75 hydraulic unit head for drilling, boring and related operations. In this view, the spindle gear box is omitted.

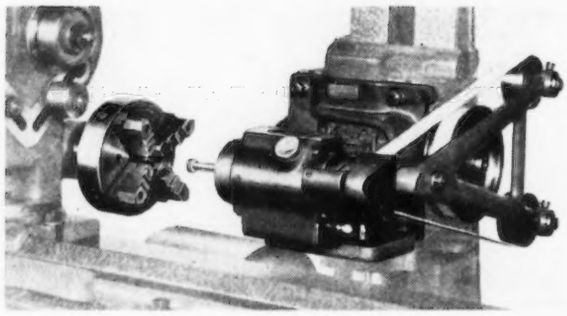
BELOW

PNEUMATIC time relays, one of which can be seen at the left, are used for fine facing feeds or for heavy boring operations on the 200 series Simplex precision boring machine built by Stokerunit Corp.



AT RIGHT

FOUR spindle, portable drilling and tapping machine with columns on 12-in. centers, announced by the Boice-Crane Co., Toledo. Unit type floor base is available with or without swivel casters. Optional equipment includes high speed or slow speed motors from 1/3 to ¾ hp.; counterweighted heads for quick positioning; ½ or 5/8-in. capacity chucks; ¼ and ½-in. high speed, quick reverse tapping heads; and Morse taper socket or taper shank type spindles. A two spindle model with floor base is another addition to the company's line of light machine tools for the metal and woodworking industries.



ABOVE

THIS internal grinding attachment for use with Brown & Sharpe No. 13 universal and tool grinding machines has a capacity range for holes with a minimum diameter of 1/4 in. and maximum length of 1 in., to holes with a minimum diameter of 7/16 in. and maximum length of 2 in. Spindle is driven by canvas belt at 27,000 r.p.m. and is mounted in two self-alining ball bearings, lubricated by filtered oil. Wheel arbors are interchangeable. A four-jawed chuck, with jaws independent and reversible, is furnished with the attachment.

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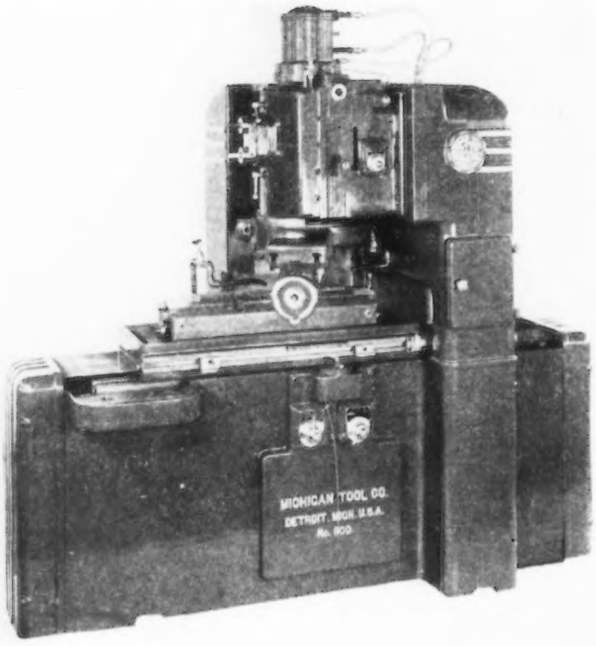
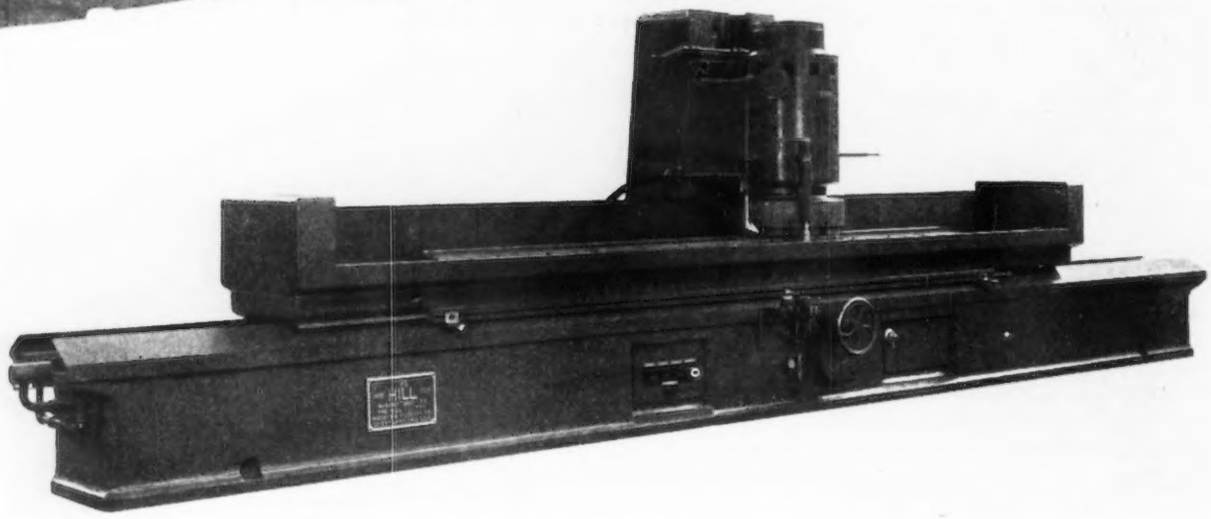


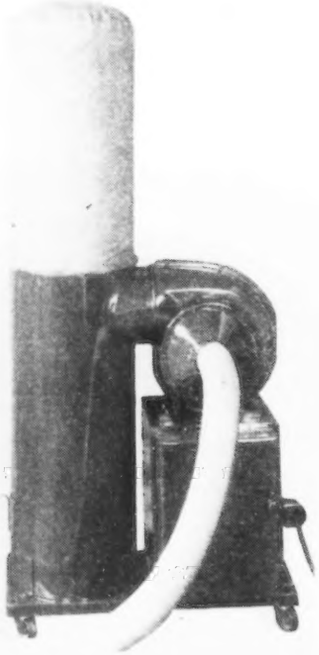
AT LEFT

MODEL 900, made by Michigan Tool Co., is a crossed-axis type of gear shaver completely hydraulically actuated. It is designed to finish gears up to 8 in. diameter, with maximum length between centers of 18½ in.



ABOVE

A VERTICAL spindle open side type, with dynamically balanced built-in motor, is the latest in the line of Hill heavy duty hydraulic surface grinders, made by the Hill Clutch Machine & Foundry Co., Cleveland. The 18 x 168 in. size is shown. Vertical spindle carries a 26-in. diameter segmental grinding wheel. The machine is regularly built with tables 18 or 24 in. wide and from 6 to 20 ft. long. Massive construction is used throughout to insure permanent accuracy and freedom from vibration.



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AT LEFT

THESE self-contained dust collectors, made by the Covel Mfg. Co., Benton Harbor, Mich., can serve one or two grinders, polishers or buffers. They come in two sizes with capacities of 150 cu. ft. of air per min. at 2 in. vacuum and 235 cu. ft. at 4 in. vacuum. Corresponding motor sizes are 1/3 and 1 hp. Multi-blade fan rotates on ball bearings and is driven by V-belt. Heavy particles are dropped in the cyclone dust collector and the lighter dust is caught inside the canvas bag, which is supported by a metal frame inside.

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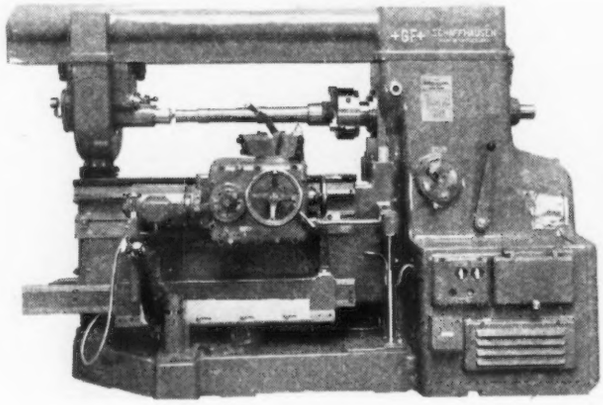
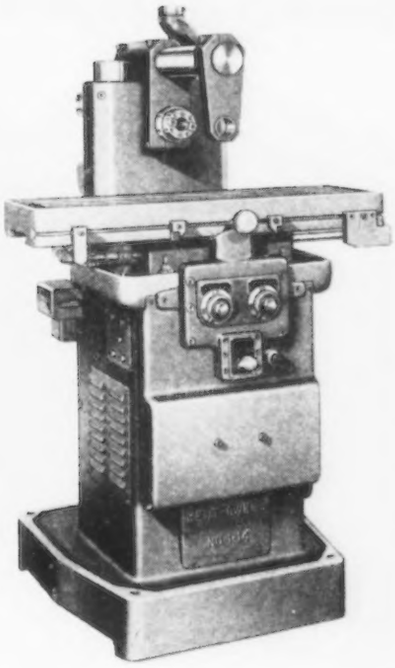


ABOVE

GF RIGID hydro-copying lathe, made in Switzerland, duplicates shapes from a template of mild steel shown below the carriage. The largest diameter that can be turned is 12 in. and the swing diameter is 19 in., with maximum length of 40 in. between centers.

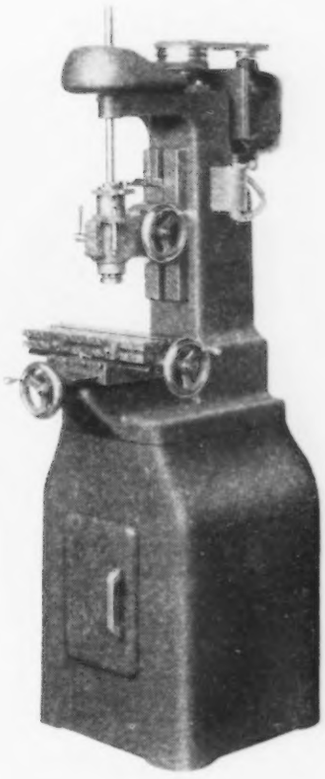
ABOVE

SMOOTH, flowing lines with rounded corners show a modernistic trend in this all steel welded bench for South Bend lathes. There are no sharp corners in which dirt or chips might collect. Around the top of the bench is a deep rolled rim which serves as a chip pan or oil pan. The entire bench is finished in standard machine tool gray. Lathe motor drive is located on the left side, while at the left are three drawers with individual tumbler locks.



ABOVE

NO. 1-14 Kent-Owens hydraulic milling machine has a 9 x 32 in. table with 14-in. travel and full automatic cycle. Table can be fed or rapid traversed in either direction and automatically reversed at both ends of the stroke.



ABOVE

EIGHT spindle speeds ranging from 275 to 4250 r.p.m. are provided the new Linley vertical milling machine and jig borer, with 5½ x 14½ in. table. Hand feed is provided all movements, with a micrometer screw feed for spindle quill.

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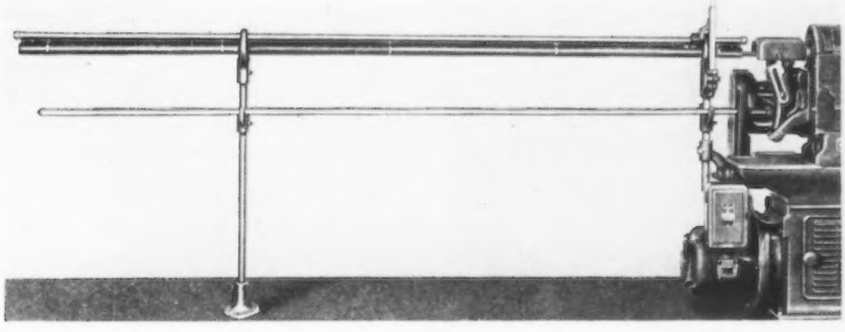

ABOVE

OBJECTIONABLE noise created by the rotation of stock in the regular stock tube of Brown & Sharpe wire feed screw machines is removed with this silent stock support, consisting of a flexible metal guide open at both ends and supported in a non-metallic casing which deadens sound and prevents transfer of vibration. The casing is free to slide in the outer support bracket and is secured to the inner support bracket by a swing latch. The support is made in four sizes.

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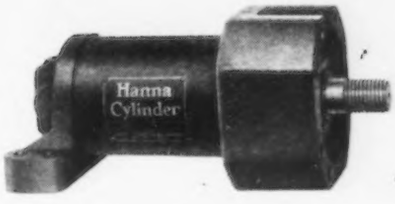


ABOVE

ONE of the 10 different models of Hanna hydraulic cylinders designed for a maximum operating pressure of 1500 lb. per sq. in., with diameters ranging from 1½ to 8 in. Cylinders are centrifugally cast high test iron, honed to a mirror finish. Pistons are fitted with step seal rings and the polished alloy steel piston rods are chevron packed. Cylinders are equipped with cushions in both heads to prevent harmful metallic impact in the cylinder and shock in its mounting. Minimum overall dimensions have been attained. Made by Hanna Engineering Works, 1765 Elston Avenue, Chicago.

o o o

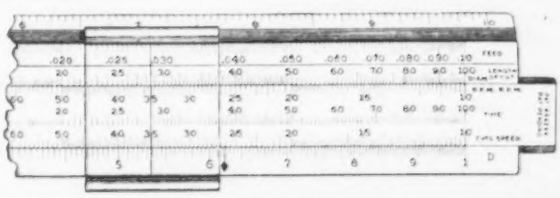
AT LEFT

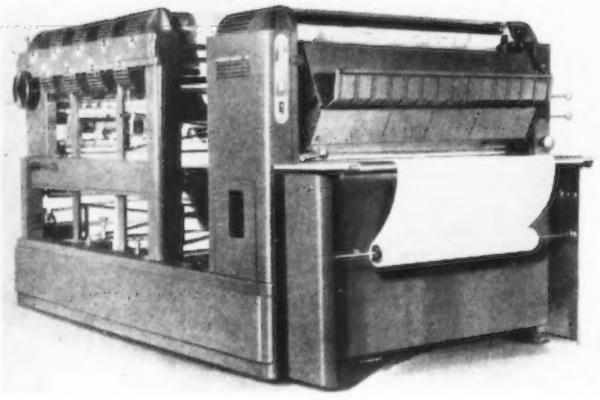
R.P.M. of the grinding wheel for six different surface speeds and wheel diameters ranging from 1 to 42 in. can quickly be ascertained on one side of this speed calculator, available from the Landis Tool Co., Waynesboro, Pa. On the reverse side, the r.p.m. of the work for four different surface speeds can be computed for work diameters from ½ to 10 in. Some useful grinding data are also included.

o o o

AT RIGHT

FEED, length of cut and diameter are represented on the upper scale; r.p.m., time and cutting speed on the slide and the regular logarithmic D scale on the bottom of the Langsner industrial slide rule, manufactured by the Eugene Dietzgen Co., Chicago, for solving common machine shop problems. The reverse of the slide contains the usual scales for standard slide rule calculations. Rule is 10 in. long, engine divided on white celluloid, with a glass, frameless indicator.





MODEL 22 continuous blue printing machine, made by the C. F. Pease Co. of Chicago, has a washer comprising three horizontal water tanks upon which the paper floats, thus eliminating tension wrinkles. Nine aluminum drums are used for drying with a flatness never before accomplished, according to Pease claims. Production rate is 24 linear feet per min. on d.c. and 18 ft. per min. on a.c. for large tracings. Speed can be reduced for smaller tracings.

A tracer following the contour of the template actuates the hydraulic mechanism that automatically raises or lowers the knee carrying the tool. The tool is set by handwheel for one diameter of work, the other diameters being set automatically. The tool is placed directly below the work, with its top side facing the rear. Spindle rotates in the reverse direction to the conventional lathe and the chips are thrown to the rear over the sloping side of the knee.

Work spindle has eight speeds ranging from 70 to 1200 r.p.m. and is driven by V-belt and ground gears from an 18-hp. motor. There are 16 longitudinal feeds ranging from 3/16 to 20 in. per min.

Hydraulic Milling Machines

TWO sizes of small milling machines with hydraulically actuated tables have been announced by *Kent-Owens*, Toledo. Spindle drive and spindle head support are the same as used in the new hand miller described last month (THE IRON AGE, June 8, page 76) the head being carried on two cylindrical ground steel posts, with the spindle positioned between them. A pair of pick-off gears in the drive provide a range of spindle speeds from 100 to 1335 r.p.m. or 150 to 2000 r.p.m. Driving motor is a standard 1-hp. ball bearing type, totally inclosed.

Hydraulic control panel and pump are standard commercial units, with pump and motor assembly conveniently mounted for accessibility. Two graduated dials provide any feed rate from ½ to 80 in. per min. In the No. 1-14 machine illustrated, by means of dogs, the 32 x 9 in. table can be fed or rapid traversed in either direction and automatically reversed at both ends of the stroke. It can be equipped with either one way or two way positive stops for accurate depth milling. The No. 1-18 machine has an 8-in. table travel instead of 14 in. and a 25 x 9 in. table. It has rapid traverse in both directions, feed in one direction only, automatic shift from traverse to feed, with automatic reverse at one end of the stroke and automatic stop at the other, but it can be equipped with a double end reverse.

The spindle head can be moved vertically to a maximum of 8 in. from table to spindle centerline. Quill construction permits a cross movement of 2½ in. to the spindle.

THE Portaprint makes positive reproductions of drawings and documents. Prints up to 12 x 18 in. can be accommodated in the exposure cabinet which contains six special lamps behind the ground glass. The special paper is developed by chemical fumes in a dry developing tube which has a small space at the bottom for the liquid chemicals. Developing and fixing takes about 2 min., printing about 1 to 1½ min. The printer operates on 110-volt a.c. Made by Eberbach & Son Co., Ann Arbor, Mich.

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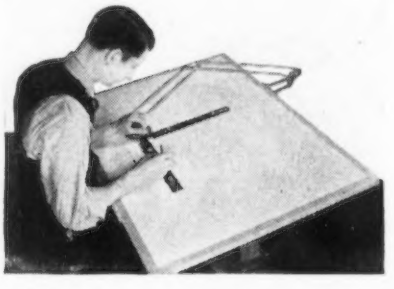
Hand Vertical Miller

FURTHER improvements have been made in the high speed vertical milling machine and jig borer made by *Linley Brothers Co.*, 16 Montauk Street, Bridgeport, Conn. Table feed in both directions is by handwheel, with dials graduated in thousandths. Longitudinal travel of 10 in. is available for the 5½ x 14½ in. table, which is provided with two adjustable stops and a lock. A lock is also provided on the saddle. Spindle is heat treated nickel steel and is mounted in preloaded precision ball bearings. Nose is machined to take collets up to ½ in. capacity.

The sliding head and the quill are counterbalanced by the same weight through a compound lever. Vertical feed is through a micrometer screw and handwheel with dial graduated in thousandths, used in conjunction with a depth stop gage graduated in 1/10 in., equal to one turn of the handwheel. Standard equipment includes a ½-hp. ball bearing motor, vertically mounted and driving by V-belt and cone pulleys. The spindle pulley is separately mounted so that there is no belt tension on the spindle. Spindle speeds range up to 4250 r.p.m.

Change Gear Guard

AN aluminum alloy guard for the change gears that drive the headstock of the universal spiral index centers is now available for use on the *Brown & Sharpe* No. 0 Omniversal milling machine. This No. 0A guard is similar to the Nos. 0, 2 and 3 guards announced previously. It is attached to the table by two screws. The full set of change gears furnished with the machine can be used, and the hinge cover swings wide for accessibility. Hand adjustment of the headstock is made by means of a handcrank inserted through a hole in the guard, which is kept closed once the gears are set up.



RELIANCE drafting machine with 18-in. arms for drawings up to 23 x 28 in. is a new, low-priced model made by the Eugene Dietzgen Co., Chicago. Among the features are: New light weight and strong anchor construction; new adjustment feature that compensates for wear; and easy thumb control of integral protractor and knob through a new angle lock. Scale chuck plates take any standard scale.

New Welded Armory

By H. S. CARD

o o o

BOX construction of the armory, below, is made possible by tie rods connecting the bottoms of opposite columns 3 ft. below the dirt floor. Photo at right shows bracing at the eaves.

THE new $300,000 armory at Morristown, N. J., built for the 112th Field Artillery, New Jersey National Guard, reflects the adoption of modern materials and methods in its appointments for comfort and utility without ostentation. It also includes in the steel framing of its largest unit an ingenious design feature which results in a box structure, in comparison with the shed structure that is usually associated with dirt floors.

A single brick-walled building, 417 ft. long by 211 ft. wide, of Colonial type architecture, contains the four units which make up the armory. The largest of these units is 260 x 142 ft. riding ring, which has an all-welded steel frame. Adjoining units, housing the administration building, gun storage, pistol range, stables, etc., are of brick and wood frame construction.

By using fabricated column arches a clear span the full width of the riding ring, including a seating gallery for 700 people, was obtained, with no steel work below the roof beams. The arch effect was obtained by splitting the webs of beam and column members and welding in segments of steel plate. The curvature of the inside beam flanges at the eaves is on a 13 ft. 3 in. radius, and at the roof peak it is on a 30 ft. radius. Height from ring floor to roof peak is 33 ft. 6 in.

Twelve of these continuous beam arches, spaced on 20-ft. centers, comprise the main members of the frame. These arches were shop fabricated, each in four sections, leaving field splices to be welded at the eaves and at the peak. Vertical members of the arch are 24-in., 140 lb. beams and roof beams are 30 in., 124 lb. Plate 5/8 in. thick is used for widening the webs at eaves and peak, and is flush butt welded to the split beam webs, the weld being made from both sides.

Field splice stiffening is by 5 x 6 x 3/8 in. angles and 5 x 3/8 in. plates on each side of the web, the plate stiffener on one side positioned opposite the 5-in. leg of the angle on the other side. Plate stiffeners are also inserted at about the midpoint of the split on each web, and are joined to the web by 3 x 1/4 in. intermittent welds on 8-in. centers, staggered.

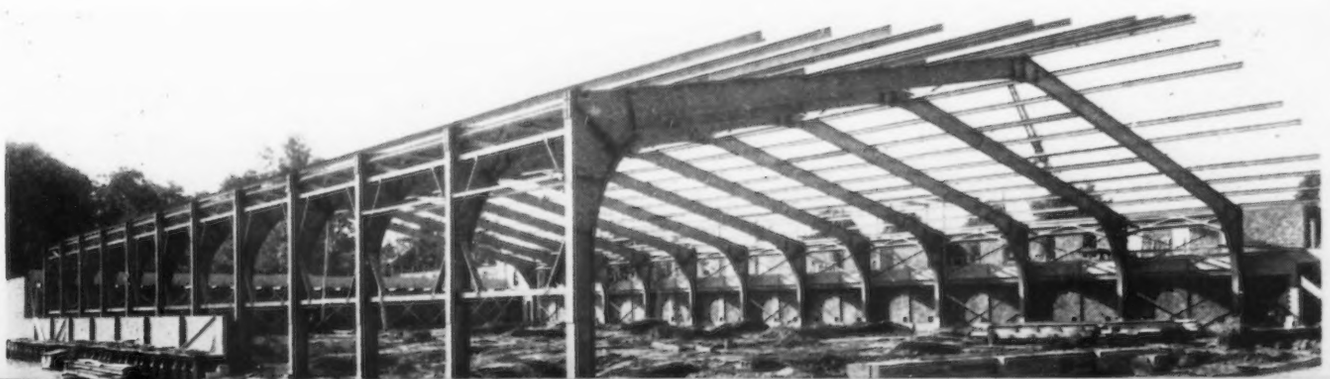
Cover plates, 12 x 7/8 in., 18 ft. long, are welded to the outside flange of the column, using 3 x 1/4 in. fillet welds, spaced on 9-in. centers. A similar cover plate on the outside flange of the roof beam is 22 in. long, and plates of the same size are welded to the inside beam flanges, extending for corresponding distances from the eaves. Reinforcing of the corner of the eave splice is by two 4 1/2 x 1 1/4 in. x 4 ft. plates outside and two 5 x 1 in. x 4 ft. plates inside. Reinforcing of the curved flange and cover plate is by two 5 x 1/2 in. x 4 ft. plates inside and a single 14 x 3/4 in. x 5 ft. plate outside.

In addition to the arch bracing along the columns, each bay required two eave struts and one ridge strut. These were all shop fabricated, using 8-in., 17-lb. beams and 8-in., 11.5-lb. channels, and 5/16-ft. plate for gussets.

Reinforcing of the peak splice is similar to that of the eave splice, except that cover plates are not used. Purlins are 8-in., 17-lb. beams, erected in two-bay lengths for continuity; where they lie over cover plates on the arch they are cut to fit. Splice plates on top of the purlins are 4 x 1/2 in. x 1 ft. 4 in. long.

A particularly interesting feature of the frame construction is the use of tie-rods in lieu of floor beams to connect the bottoms of opposite columns 3 ft. below the dirt floor. In order to provide for this connection, the sole plate in each column base was cut to extend ten inches beyond the end of the base plate. The sole plate is 18 x 1 1/2 in. x 4 ft. and the base plate is 20 x 4 in. x 3 ft. 1 in. Welded to the bottom of the sole plate at the center line of the column web is a 2 1/2 x 2 in. x 1 ft. 8 in. bar with the bottom finished to a 15-in. radius. This bar rests in a 4 x 1 in. slot, 1 ft. 8 in. long, machined in the top of the base plate, leaving a 1-in. clearance between sole plate and base plate.

A No. 7 clevis is fastened to the sole plate with a 3-in. pin, and opposite clevises are joined by 2 3/8-in. rod, in which are inserted three standard turnbuckles. The rod is upset to 3-in. diameter at turnbuckles and clevises. This tieing together of the column bases gives greater rigidity than is commonly found in floorless structures. All of this, however, is hidden below 3 ft. of dirt. Visitors will more readily notice, and admire, the generous headroom and visibility gained by using the split beam arches, and the sleek lines of the welded structural work.



THIS WEEK

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ON THE ASSEMBLY LINE

By W. F. SHERMAN
Detroit Editor

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. . . Die strike ties up General Motors; brings suspension of GM loan plan . . . Assembly totals passing last high week as plants close for change-over . . . Desultory buying by Detroit industries continues for sixth month.

DETROIT—While the strike of General Motors tool and die workers and other skilled employees continued on an unpredictable course, the industry as a whole began to mark time for the changeover to 1940 models. For the most part the industry expresses a feeling of uncertainty, although current production of 1939 models continues at a satisfactory seasonal level.

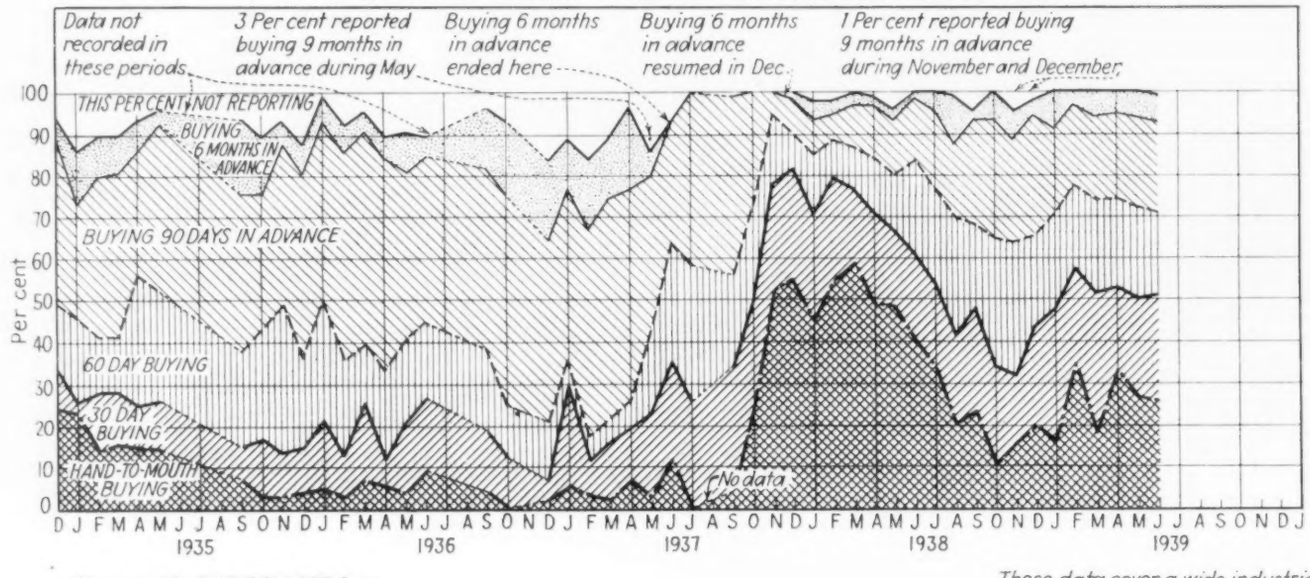
The walkout of a few thousand men, which threatens to throw many thousands of productive workers off the pay rolls, brought the usually genial William S. Knudsen, president of the corporation, around to the point of taking stern action last week. Effective Monday, he suspended the GM loan fund operation in all plants "affected directly and indirectly by this strike." The income-security plan placed in effect Jan. 1 enabled employees of five years' continuous service to borrow from the corporation without interest during layoffs. The corporation agreed at that time to advance in any week the difference between the emplyees' actual earnings (if he had any employment at all) and 60 per cent of his standard weekly earnings.

Mr. Knudsen pointed to a regulation by which the corporation reserved the right to suspend the plan in the event of strike.

While fast-moving figures showed each day an increasing number of unemployed, James F. Dewey, Federal labor conciliator, was unable to make arrangements for a joint conference. The UAW-CIO called the strike ostensibly in an attempt to win a supplementary agreement for skilled workers, but the corporation finds itself faced with a constant threat in the form of Homer Martin's UAW-AFL, despite Martin's weakness. Mr. Knudsen has emphasized the corporation's contention that it could not negotiate either a new contract or changes in the old one until the courts or the NLRB have settled the dispute between the two UAWs. The corporation itself has appealed to the NLRB to hold an election to settle the issue.

Conflicting claims of strike effectiveness are made. At the start of this week nine plants were affected in varying degrees. The union asserted that in one case, the Fleetwood unit of Fisher Body, 500 production workers had joined the strike. Although denying this, the corporation said that all of the 5600 production workers at the Chevrolet plant would be sent home this week because production tools

BUYING TRENDS IN METAL-WORKING FIRMS IN DETROIT


Data not recorded in these periods
3 Per cent reported buying 9 months in advance during May
Buying 6 months in advance ended here
Buying 6 months in advance resumed in Dec.
1 Per cent reported buying 9 months in advance during November and December
THIS PER CENT NOT REPORTING
BUYING 6 MONTHS IN ADVANCE
BUYING 90 DAYS IN ADVANCE
60 DAY BUYING
30 DAY BUYING
HAND-TO-MOUTH BUYING
No data
Per cent
100
90
80
70
60
50
40
30
20
10
0
D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J
1935
1936
1937
1938
1939

Prepared by THE IRON AGE from data supplied by PURCHASING AGENTS ASSOCIATION OF DETROIT

These data cover a wide industrial field, including stove, refrigerator, office equipment, steel, auto parts, accessary and auto plants.

This is a JIG BORER . . . . . it was created at Pratt & Whitney 21 years ago . . . . . it was designed from the floor up for precision boring . . . . . it is built to the highest accuracy standards of any machine tool in the world . . . . . it is constantly setting new records for speedy, precise boring . . . . . it has never failed to deliver long, lasting, accurate service . . . . . it has always paid dividends to its users . . . . .

Bring us one of your precision boring jobs, and we will demonstrate that the Pratt & Whitney Jig Borer is the best investment your shop can make.

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Division **Niles-Bement-Pond Company • Hartford, Conn., U. S. A.**

could not be resharpened. The strike embraces tool and die makers and maintenance and engineering workers, so the men who ordinarily grind tools and cutters are out on strike. Between five and six thousand men are participating in the strike directly. There are a total of 8000 who might possibly be affected directly, but the jobs of 100,000 production men are imperiled.

Homer Martin's insistence that his group be recognized in plants where he has some strength is evidence of an unusual readjustment in his attitude concerning collective bargaining on a corporation-wide basis. One of the most important and prolonged arguments with Chrysler and General Motors in 1937 concerned Martin's demand for recognition of the union he headed then as bargaining agent in all of the far-flung plants of the big automobile companies. However, now that Martin is heading a minority faction, operating under an AFL charter, he argues the other side of the question. He is asking NLRB assistance in setting up effective grievance committees in several GM shops. In the recent NLRB hearing in the Briggs case, the UAW-AFL attorney argued that bargaining should be conducted separately in each of the seven Briggs plants in Detroit and in the one at Evansville, Ind. Bargaining on a corporation-wide basis, he said, "will lead to more strikes, more demands by the working men and greater dissatisfaction."

The post-holiday rebound in assembly totals which is expected during the current week will carry the industry up to about 60,000 units, but from that point onward the trend will be sharply downward each week. (The 60,000 figure will suffer a lot of trimming if General Motors production units are affected by the strike.) During the holiday week, volume went down to 42,784 from the previous week's 70,663. This still offered a good margin over the corresponding 1938 holiday week production of 29,375 units. The effect of the holiday and the fact that eight passenger car plants are reported at the end of their 1939 model runs is reflected in the week's total, however. General Motors plants turned out 13,775 assemblies, against 22,873 in the previous week. Chevrolet accounted for practically all of this volume, having produced 13,200 cars in the past week and 18,000 the week before. Ford volume was 10,800, against 19,700, including the Lincoln-Zephyr which amounted to 300 in the past week. While Ford V-8 and Chevrolet are still big factors in output, the Chrysler picture is different. There the corporation total slipped fom 21,810 to 13,980, but Plymouth's volume of 6950 was only half of the corporation total. Dodge and other Chrysler units accounted for the rest, but Dodge, at least, is out of the running now, so whatever production there is in the next few weeks will center around the Big Three low-priced cars. Ford is expected to be active until Aug. 10.

Packard has been erroneously reported in some quarters as being already operating its assembly lines, according to a Packard spokesman. However, the plant *is* in production on 1940 parts and in some cases has already managed to get sub-assembly lines operating. Final assembly operations may be started any day. The General Motors strike makes it unlikely that Buick will get into the running this week or next week as had been planned by the company and predicted in the Assembly Line.

Reflecting continued caution during June, industrial buyers in the Detroit area for the sixth successive month held their commitments down to a point where more than 50 per cent of all purchasing in the area is on a hand-to-mouth basis or, at most, within a 30-day range. A comparison of figures for May and June compiled by the Purchasing Agents Association of Detroit showed little difference in attitude on the part of purchasing agents or management officials who supposedly are exercising control over purse strings. Hand-to-mouth buying in June was 26 per cent, only a one point drop from May. More than offsetting this was a two point increase, to 25 per cent, in the 30-day group. A loss, minor but nevertheless a factor, was shown in the group that has been buying 60 days ahead. This classification dropped from 22 per cent to 20.

Prospects are enlivened a bit by knowledge that 1940 automobile production will require further purchasing during July.

Stran-Steel Division of Great Lakes Steel Corp. and other steel suppliers will furnish an estimated 1500 to 1600 tons of steel materials for the biggest building program undertaken in this area in years. It is the Ford Foundation housing project on which immediate construction has been started for

THE BULL OF THE WOODS — BY J. R. WILLIAMS

NO, I AIN'T GOT IT DONE! I'VE TOLD YOU TWENTY TIMES THAT I'LL FIX THAT WHEN I GET TIME -- I HAFTA DO THAT STUFF DURIN' TH' LUNCH HOUR WIT' ONE HAND WHILE I EAT WIT' TH' OTHER!
OH, THAT'S ALL RIGHT, DICK-- TAKE YOUR TIME, TAKE ANOTHER YEAR -- TWO! DON'T THINK I'M TRYIN' TO HURRY YOU!
A GUY MUST BE AWFUL TIGHT WHO'LL TAKE ALL THAT JUST TO GET HIS ELECTRIC TOASTER FIXED FER NOTHIN'!
BUT YOU HAVE NO IDEE HOW MUCH YOU SAVE -- HE'S FIXIN' ALL OUR ELECTRIC APPLIANCES AN' MY WIFE CAN'T USE 'EM FER MONTHS AN' MONTHS -- BOY, WHAT WE SAVE ON LIGHT BILLS!
COPR. 1939 BY NEA SERVICE, INC. T. M. REG. U. S. PAT. OFF.
ECONOMY
J R WILLIAMS 7-7

15 apartment buildings — with 203 families to be accommodated—and 53 single homes.

Originally the project was laid out to make use of wood construction, it is known. The Ford lumber holdings in northern Michigan were to supply the material. However, after viewing three construction projects in Houston and Dallas, Tex., and hearing the details of one in Shreveport, La., Ford executives charged with responsibility for the job, switched over to the Stran-Steel type of structure and contracted with the Byrne Organization, which has done much of the erection work on large Stran-Steel projects so far.

The initial housing units mentioned above and a community center building will require 600 to 650 tons of the light structural steel members manufactured by Stran-Steel. In addition, metal lath will be used throughout and concrete sub-floors will be poured on galvanized corrugated sheets which will be supported on Stran-Steel floor joists. Interior partitions will be of metal lath on steel studs. With this type of construction, only finished floors, doors and trim will be of wood. Steel will be used even for door frames. Exteriors will be of brick. The single homes will be five and six-room structures, built to be sold at prices starting at $5,500. The total cost of construction of the units in the first group and a business center will be $1,525,000. Work is scheduled to be completed in November.

In addition, the foundation is preparing for early construction of 176 more single homes and 158 apartment accommodations. The housing project is located in Dearborn, at Airport Drive and Greenfield Road, within sight of the Ford Rotunda.

Stran-Steel, a comparatively new product, has been used in a number of major privately financed housing projects but the Ford job is by far the biggest and most important to date.

Hanging in the balance as new model commitments are made is the prospect of a great increase in tonnage of stainless steel strip. Chevrolet has taken bids—*again* this year, it might be noted—on stainless for hub caps. There are only two major applications of stainless in the automobile industry: body belt moldings, which use a very narrow band of stainless over a base metal; and hub caps, with only Ford using stainless for this application now. Ford uses a conventional 18-8 chrome-nickel type of material, it is understood, but Chevrolet is said to be favoring a straight chrome alloy, with 16-18 chrome.

INFORMATION for the Tool and Die Buyer

THE Cimatool organization knows dies—all kinds of dies, large and small, and it is thoroughly experienced in the design, construction and use of dies.

The Cimatool plant is the last word in equipment for the economical fabrication of tools and dies.

Delivery schedules are conscientiously maintained.

All dies are given an actual try-out under working conditions before leaving the plant—no time lost for the subsequent correction of errors.

Dayton is removed from those local influences which may affect the user's plant and neighborhood. Yet Dayton is within easy reach by road, air or railroad.

Cimatool can furnish impressive references on all types of tool and die work.

FOR PROFITS MACHINE TOOL SHOW
MTS
CLEVELAND
OCT. 4 to 13, 1939

Cimatool

THE CIMATOOL COMPANY
Dayton, Ohio, U.S.A.
DIEMAKERS • • TOOL MAKERS
MACHINE TOOLS

THIS WEEK IN WASHINGTON

. . . Commerce Department talks with business seen as build-up for new Federal bureau . . . Results of Department of Justice steel study ready for TNEC in fall . . . Total proceeds of steel industry's sales well under New Deal budget.

o o o

By L. W. MOFFETT
Washington Editor

o o o

WASHINGTON — The Commerce Department's recently inaugurated procedure of inviting business groups in for friendly huddles — a movement designed to make the agency an oasis for industries growing in the desert of Government-business relations — has accomplished little if anything to date except perhaps to serve as a build-up for the creation of a bureau of industrial economics.

After meeting with three industries —motion picture, California oil refining, and potash—those on the inside concede that the department has no specific plan of action, is attempting to follow no regular procedure but is hopeful that the conferences may point the way to some specific type of agency under which the work can be carried on more effectively.

May Be Missing Link

The movement is based upon the theory that in the past businessmen have usually been summoned to Washington by a Government agency clothed with punitive powers, that industry representatives under these circumstances found it next to impossible to obtain free and open discussion of baffling problems. Department of Justice legalites from time to time have deplored this situation, including Thurman Arnold, assistant attorney general and the Administration's No. 1 trust buster, who has said that, while he could institute anti-trust action against a company or a group, he was unable with Justice Department powers to improve the situation.

The Commerce Department is necessarily vague about what part, if any, it can play in the picture but it is feeling its way along under the team of Hopkins, Noble and Thorp with little or no assurance of where it is going, hoping that its activities might prove to be the missing link which it says, Government and business have been seeking for years. All of the industries with which key officials have been conferring are involved in one way or another with actions instituted by the Justice Department and there have been erroneous reports that the Commerce Department, which obviously has no such power, was negotiating for a consent decree.

"Procedure Exploratory"

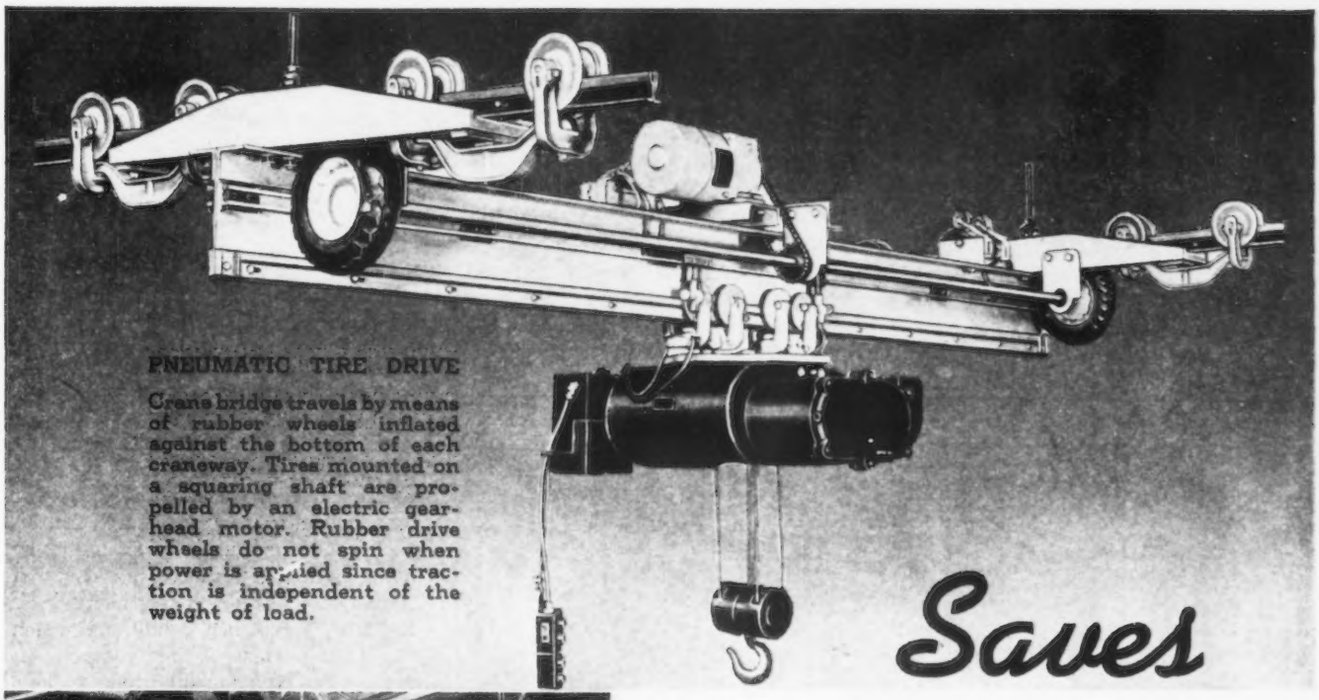
There has been a certain amount of mystery and intrigue connected with these meetings although Commerce officials have not been entirely reluctant to discuss the rough details. In the words of Merle Thorp, economic adviser to Commerce Secretary Hopkins, "the department is experimenting with the idea in a cooperative sort of way to see if a non-regulatory body can help straighten out problems with which an industry is concerned; but the whole procedure is entirely exploratory."

The whole process is working out this way: If a particular industry or part of an industry feels, for example, that its pricing situation offers a knotty puzzle, the situation is brought before the department and the matter is taken up "when it feels it can do something to remedy the situation." As for selecting particular subjects for analysis, the sky is the limit. It may include subjects involving consumer complaints production control or non-flexibility in prices. If an industry has a record of little or no price changes over a 10-year period, that might be selected as the starting place in launching a further inquiry. Officials insist, however, that industries aren't approached but rather come to the department seeking help. After a specific problem is described, the department's economists scout around looking for other angles which might shed some further light on the situation. The difficulty so far, according to these officials, has not been in finding problems to discuss but rather to limit them to subjects on which "we might be able to help."

Tears for Little Fellow

Some groups desirous of making a competitive move have been known to approach the department, asking for information as to whether the contemplated step is a proper one. Here again any action or advice on the part of the agency is strictly taboo. Nevertheless it is not discouraging such overtures for it is felt that they might help to get a detailed picture of the industry's functions.

The Commerce Department has been in the front ranks of administration agencies which from time to time have shed tears for the small business men: but aside from urging the enactment of legislative aids and turning what figures it has available over to small business units, there actually isn't much else it can do under present circumstances. What it feels it lacks most in the way of keeping its ears to the ground in the interest of small business is the lack of decentralization. Secretary Hopkins has moved to eliminate this deficiency to a certain degree by urging Congress to pass legislation creating business research stations in state universities. Although admittedly designed to help the small business units, what is more important to the Commerce Department is that the small business men could be reached more readily than through the present highly-centralized agency in Washing-

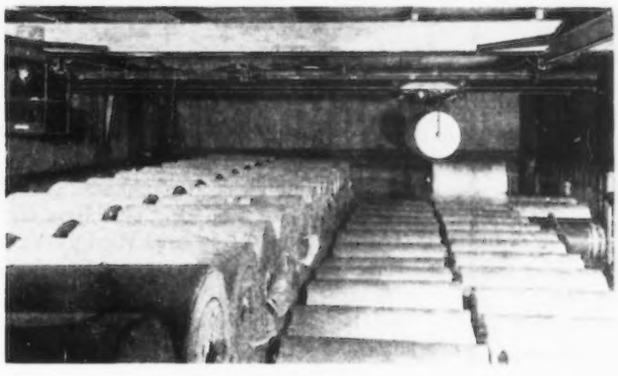


PNEUMATIC TIRE DRIVE

Crane bridge travels by means of rubber wheels inflated against the bottom of each craneway. Tires mounted on a squaring shaft are propelled by an electric gearhead motor. Rubber drive wheels do not spin when power is applied since traction is independent of the weight of load.

Saves handling cost

A single 1½ H. P. motor drives a 62 ft. crane.



Crane requires little headroom for high piling.

Nearly every application of American MonoRail Cranes, whether hand or power operated, reduces the cost of handling heavy or cumbersome loads.

Cranes equipped with the American MonoTractor drive start immediately because traction is independent of the load. They move at variable speeds with lowest possible power cost. Horizontal or vertical movement can be controlled from floor or cab.

With the structural design greatly simplified, dead weight of the crane bridge is kept at the lowest point consistent with strength. This provides maximum live load capacity and requires less effort to move the crane. Elimination of friction at all points by the scientific use of proper bearings make American MonoRail cranes the easiest of all to handle.

You make no mistake in selecting an American MonoRail Crane. Let an experienced materials handling engineer consult with you on your next problem and offer definite recommendations.

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ton, providing a contact pipe line which the department now lacks.

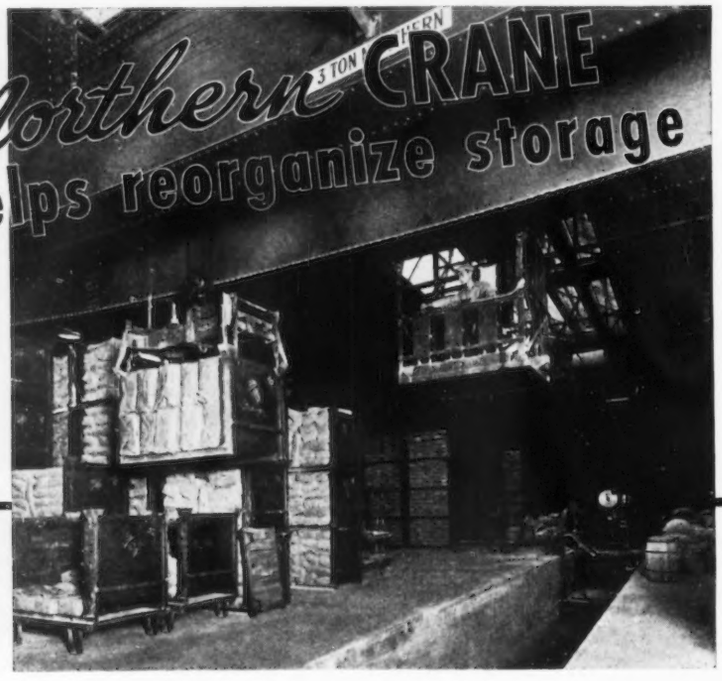
Little Fellow Cool

Strangely enough small business units, unlike Secretary Hopkins, came a long way from waxing enthusiastic about the proposal and trade associations particularly were cool to the plan, insisting that with their activities, business research stations throughout the country would be so much excess baggage.

But the whole idea, including the Hopkins' plan to engage several new experts and the current conferences with industry groups, all fits in with the proposal to establish a bureau of industrial economics which Mr. Hopkins would very much like to take under his wing. President Roosevelt has indirectly endorsed the plan and presumably has seriously considered the idea from several angles. He suggested more than a year ago that the Temporary National Economic Committee undertake to study the functions of such a bureau. These are his own words:

". . . Creation of a Bureau of Industrial Economics which should be endowed with adequate powers to supplement and supervise the collection of industrial statistics by trade associations. Such a bureau should perform for business men functions similar to those performed for the farmers by the Bureau of Agricultural Economics.

"It should disseminate current statistical and other information regarding market conditions and be in a position to warn against the dangers of temporary over-production and excessive inventories as well as against the dangers of shortages and bottleneck conditions and to encourage the maintenance of orderly markets. It should study trade fluctuations, credit facilities and other conditions which affect the welfare of the average business man. It should be able to help small business men to keep themselves as well-informed about trade conditions as their big competitors."



THE warehouse gang used to handle every sack of frit (raw material for porcelain enamel) by hand, to and from piles 15 feet high. This was the hardest kind of labor and produced clouds of chemical dust which settled all through the plant.

Now a 3-ton Northern Crane handles U-shaped pallets, each carrying two tons of frit as a unit. There is no more heavy lifting, no dust, no more broken sacks at the bottom of the high pile, and movement to and from storage is very much faster.

Let Northern engineers study your handling problems.

NORTHERN ENGINEERING WORKS, ***Detroit, Michigan***

CRANES *Northern* HOISTS

U. S. Legislation for Defense Completed

WASHINGTON—Except for an expected appropriation of $25,000,000 for the purchase of strategic and critical raw materials during the current fiscal year ending July 1, 1940, Congress has virtually completed the necessary legislative steps to give the War Department just about what President Roosevelt recommended in his national defense message of last January—$477,000,000 for new needs of the Army.

This amount has been made available out of a total of approximately $961,000,000 appropriated for the War Department in three appropriation measures. Broken down, it will enable the department during the current fiscal year to:

1. Spend $14,250,000 for the placing of educational orders with private companies.

2. Spend $110,000,000 for critical items of equipment, including anti-aircraft artillery, semi-automatic rifles, anti-tank guns, tanks, light and heavy artillery, ammunition and gas masks, the major portion or about $99,366,362 to be essentially ordnance. Completed articles and major components to be procured from private industry will amount to about $60,000,000 and about 75 per cent of the total, including an

additional $46,206,000 appropriation for ordnance, will go for raw or semi-finished materials as well as for completed articles and major components.

3. Spend $300,000,000 for 5500 airplanes. About $50,000,000 of this amount was made available late in April and has since been obligated by awards to industry calling for new craft, spare parts, radio equipment and armaments. The $120,000,000 balance will be used for new aircraft, necessary spare parts, and armament. Tentative awards already have been placed for $4,000,000 for aircraft construction with the remainder of the funds to be obligated by the end of this month.

4. Spend $53,000,000 for a material increase in Panama Canal defenses.

5. Spend $12,191,390 on strengthening seacoast defenses; and $8,241,699 for research, development and planning.

Government Orders for Week Ended July 1

WASHINGTON — Government contracts for iron and steel products as reported by the Labor Department's Public Contracts Division for the week ended July 1 totaled $370,471. For the same period contracts for non-ferrous metals and alloys amounted to $159,570 and for machinery, $615,046. Details follow:

Iron and Steel Products

Edge Moor Iron Works, Edge Moor, Del., slides, rings, etc.	$237,320.00
Lalance & Grosjean Corp., Washington, D. C., and Woodhaven, L. I., N. Y., dish pans	52,300.00
Electric Industrial Equipment & Supply Corp., Baltimore, pipe	10,810.20
Himelblau, Byfield Co., Chicago, steel pipe	20,936.16
Crane Co., Chicago, pipe fittings	12,289.80
Denman & Davis, North Bergen, N. J., steel bars	11,048.40
Allegheny Ludlum Steel Corp., Pittsburgh, steel strip	13,881.66
South East Joslyn Co., Cincinnati, steel strand	11,885.94

Non-Ferrous Metals and Alloys

Aluminum Company of America, New Kensington, Pa., alloy	$12,209.54
Nassau Smelting & Refining Co., Inc., Tottenville, N. Y., copper ingot	56,887.40
Kennecott Sales Corp., New York, copper ingot	30,800.00
International Minerals & Metals Corp., New York City, copper ingot	33,868.50
American Smelting & Refining Co., New York, copper ingot	25,805.00

Machinery

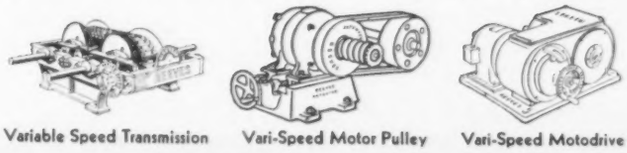
Carbondale New York Co., Inc., New York, air conditioning equipment	$17,117.60
The Watson-Stillman Co., Roselle, N. J., hydraulic press	58,500.00
Wm. Sellers & Co., Inc., Philadelphia, machines	130,000.00
Bay City Shovels, Inc., Bay City, Mich., shovels	10,900.00
Miller Printing Machinery Co., Pittsburgh, cylinder presses	40,599.00
Miehle Printing Press & Mfg. Co., Chicago, automatic units	41,475.00
American Type Founders, Inc., Elizabeth, N. J., presses	58,410.00
The Huber Mfg. Co., Marion, Ohio, road roller	21,826.00
McKiernan-Terry Corp., Harrison, N. J., cableway	12,450.00
American Engineering Co., Philadelphia, windlasses	47,950.60
Clyde Iron Works, Inc., Duluth, Minn., winches	15,600.00
The Kline Mfg. Co., Columbus, Ohio, windlass assembly	10,759.00
Buffalo Forge Co., Buffalo, N. Y., ventilating equipments	119,281.00
The Waterbury Tool Co., Waterbury, Conn., hydraulic gear	12,900.00
Ransome Concrete Machinery Co., Dunellen, N. J., concrete mixers	17,279.80

Planning Plane Plant For Pontiac, Mich.

TOLEDO — Lennert Aircraft Corp., Toledo, is negotiating with the city of Pontiac, Mich., for the leasing of a large hangar at the Pontiac municipal airport. The company plans to build army type training planes and will employ more than 200 men.

Because different sizes of castings cool at different rates, to insure that each size shall reach the sand blast station at the same temperature, this foundry mold conveyor is equipped with a REEVES Variable Speed Transmission. Now, merely by turning a handwheel, the conveyor is speeded up or slowed down *exactly* as required for the size castings going through. Many other ways in which REEVES units are being used for greater speed and accuracy in all types of metal working plants are described in 124-page Catalog. Send for free copy. REEVES PULLEY CO., Dept. I, Columbus, Ind.

THE 3 BASIC UNITS IN THE MODERN REEVES LINE



Variable Speed Transmission — Vari-Speed Motor Pulley — Vari-Speed Motodrive

Reeves SPEED CONTROL

Iron and Steel Imports (In Gross Tons)

	May		Five Months Ended May	
	1939	1938	1939	1938
Pig iron	3,219	1,795	11,578	19,465
Sponge iron	6	4	609	317
Ferromanganese[1]	4,670	951	16,014	4,276
Spiegeleisen	1,214	777	8,177	4,612
Ferrochrome[2]	17	....	90	37
Ferrosilicon[3]	63	52	645	251
Other ferroalloys[4]	25	....	132	1
Scrap	3,971	395	12,266	856
Pig iron, ferroalloys and scrap	*13,185*	*3,974*	*49,511*	*29,815*
Steel ingots, blooms, etc.	1	....	4	4
Billets, whether solid or hollow	40	42	126	345
Wire rods	863	461	4,229	2,193
Semi-finished steel	*904*	*503*	*4,359*	*2,542*
Concrete reinforcement bars	275	152	1,581	521
Hollow steel bars	168	24	540	420
Merchant steel bars	1,408	2,596	8,362	8,455
Iron slabs	....	....	....	....
Iron bars	47	37	276	284
Boiler and other plate (including skelp)	2	7	5	110
Sheets, skelp and saw plate	160	119	976	4,794
Die blocks or blanks, etc.	65	1	80	35
Tin plate, taggers' tin and terneplate	5	7	24	27
Structural shapes	5,008	6,533	20,692	18,348
Sashes and frames	....	....	5	....
Sheet piling	....	....	462	....
Rails and track material	720	269	2,886	1,668
Welded pipe	389	544	3,342	1,811
Other pipe	364	1,354	23,846	10,834
Cotton ties	31	5	33	24
Other hoops and bands	2,061	2,140	9,041	7,883
Barbed wire	1,829	727	8,375	6,960
Round iron and steel wire	116	134	1,170	528
Telegraph and telephone wire	....	....	2	5
Flat wire and steel strips	313	161	1,309	1,199
Wire rope and strand	143	150	939	941
Other wire	132	124	991	662
Nails, tacks, and staples	621	568	4,168	2,928
Bolts, nuts, and rivets	17	9	60	60
Horse and mule shoes	34	30	196	147
Rolled and finished steel	*13,908*	*15,691*	*89,361*	*68,644*
Malleable iron pipe fittings	4	1	24	37
Cast iron pipe and fittings	76	350	351	858
Castings and forgings	*65*	*295*	*801*	*1,202*
Total	28,142	20,814	144,407	103,098

[1] Manganese; [2] chrome; [3] silicon, and [4] alloy content.

Iron and Steel Exports (In Gross Tons)

	May		Five Months Ended May	
	1939	1938	1939	1938
Pig iron	6,737	33,931	20,244	191,141
Ferromanganese and spiegeleisen	2	45	36	159
Other ferroalloys	141	28	384	550
Scrap, iron and steel	382,642	371,745	1,378,694	1,624,795
Scrap, tin plate	1,384	1,336	7,075	7,832
Waste-waste tin plate	855	1,239	4,295	3,620
Pig iron, ferroalloys and scrap	*391,761*	*408,324*	*1,410,728*	*1,828,097*
Ingots, blooms, billets, sheet bars	6,927	10,752	40,762	108,035
Ingots, etc., alloy steel, incl. stainless	18	4,063	6,356	4,711
Skelp	711	683	3,628	6,189
Wire rods	1,881	2,098	7,039	13,575
Semi-finished steel	*9,537*	*17,596*	*57,785*	*132,510*
Bars, plain and reinforcing	11,428	11,331	57,436	66,944
Bars, alloy steel	2,108	503	6,349	2,009
Bars, stainless steel	5	26	188	197
Iron bars	23	18	268	655
Plates, plain and fabricated	21,096	21,946	105,536	103,962
Plates, alloy steel	141	466	402	1,821
Plates, stainless	14	18	36	132
Sheets, galvanized steel	6,854	6,595	35,574	26,921
Sheets, galvanized iron	382	259	2,365	1,549
Sheets, black, plain steel	18,761	13,485	112,288	83,988
Sheets, alloy steel	518	141	1,381	1,931
Sheets, stainless	109	88	370	658
Sheets, black iron	630	589	2,776	2,485
Hoops, bands, strips, plain steel	5,443	4,068	28,679	25,162
Hoops, bands, strip steel, alloy	88	19	215	112
Hoops, bands, strip steel, stainless	49	20	384	232
Tin plate and taggers tin	16,124	9,079	73,237	76,388
Terne plate (including long ternes)	376	293	1,543	2,211
Structural shapes, plain material	6,891	12,698	31,639	42,008
Structural material, fabricated	2,707	1,523	13,243	17,289
Sheet piling	236	374	1,816	1,753
Tanks, steel	2,020	1,628	8,798	13,866
Steel rails	5,184	1,454	24,172	37,657
Rail fastenings, switches, spikes, etc.	1,128	530	6,602	4,970
Boiler tubes	695	1,232	2,886	3,538
Casing and oil line pipe	7,504	8,196	29,920	43,018
Pipe, black and galv., welded steel	3,146	1,848	15,859	9,155
Pipe, black and galv., welded iron	338	383	2,479	1,977
Plain and galvanized wire	3,537	3,760	20,154	16,682
Barbed wire and woven wire products	4,003	2,837	16,975	9,514
Wire rope and other products	874	909	4,891	4,494
Nails and tacks	1,955	2,297	9,149	8,493
Bolts, nuts, rivets and washers except track	645	739	3,276	3,532
Other finished steel	533	156	2,619	1,861
Rolled and finished steel	*125,545*	*109,448*	*623,505*	*617,154*
Cast iron pipe and fittings	1,001	1,846	12,259	9,302
Malleable iron screwed fittings	307	334	1,457	1,306
Carwheels and axles	2,293	2,092	9,479	8,677
Castings, iron and steel	334	630	2,360	2,705
Castings, alloy steel, incl. stainless	166	58	614	283
Forgings, plain	1,460	258	4,306	3,398
Forgings, alloy steel, incl. stainless	237	42	878	212
Castings and forgings	*5,798*	*5,260*	*31,353*	*25,383*
Total	532,641	540,628	2,123,371	2,603,644

May Iron-Steel Imports Lower

WASHINGTON — Preliminary figures released by the Metals and Minerals Division, Bureau of Foreign and Domestic Commerce, show that imports of iron and steel products, excluding scrap, totaled 24,171 gross tons in May as compared with 41,314 tons in April and 20,419 tons in May, 1938. May imports were valued at $1,405,883, April imports at $2,703,290 and May, 1938, imports at $1,160,068, the department reported.

The chief source of supply was Belgium with 8548 tons, of which structural shapes represented 4107 tons. Next in line was The Netherlands with 2783 tons of ferromanganese out of the 2800-ton trade. Third place went to British India with 2608 tons of pig iron out of total imports of 3219 tons. Canada supplied 511 tons of pig iron and Sweden 100 tons.

Structural shapes ranked first in point of tonnage, 5008 tons having been received. May imports of ferromanganese totaled 4670 tons valued at $343,720. From The Netherlands came 2783 tons and from Norway, 1627 tons. Imports of spiegeleisen totaled 1214 tons valued at $39,031, of which Canada supplied 1212 tons. Imports of 35 per cent manganese ore totaled 14,565 tons.

United States Imports of Pig Iron by Countries of Origin

(In Gross Tons)

	May		Five Months Ended May	
	1939	1938	1939	1938
United Kingdom	....	42	....	42
British India	2,608	498	7,243	9,659
Germany	....	....	....	....
Netherlands	....	1,004	3,035	5,362
Canada	511	51	1,100	1,064
France	....	....	....	....
Belgium	....	....	....	....
Norway	....	200	....	3,338
Sweden	100	....	100	....
Russia	....	....	....	....
All others	....	....	100	....
Total	3,219	1,795	11,578	19,465

May Imports of Iron and Manganese Ores

(In Gross Tons)

	Iron Ore		Manganese Concentrates, 36 Per Cent or Over	
	1939	1938	1939	1938
Canada	62	....	....	....
Cuba	21,001	1	4,065	7,497
Chile	154,750	155,200	....	....
Spain	....	....	....	....
Norway	23,846	....	....	....
Sweden	16,592	24,958	....	....
French Africa	....	....	....	....
Russia	....	....	5,185	3,565
India	....	....	1,851	995
Brazil	....	....	....	5,891
Gold Coast	....	....	3,462	878
Other countries	390	5,505	2	....
Total	216,541	185,664	14,565	18,826

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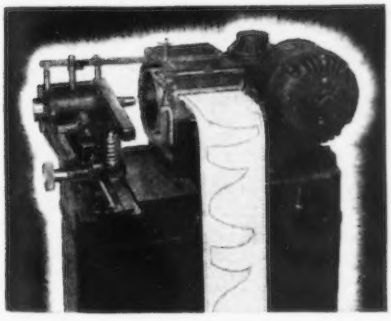

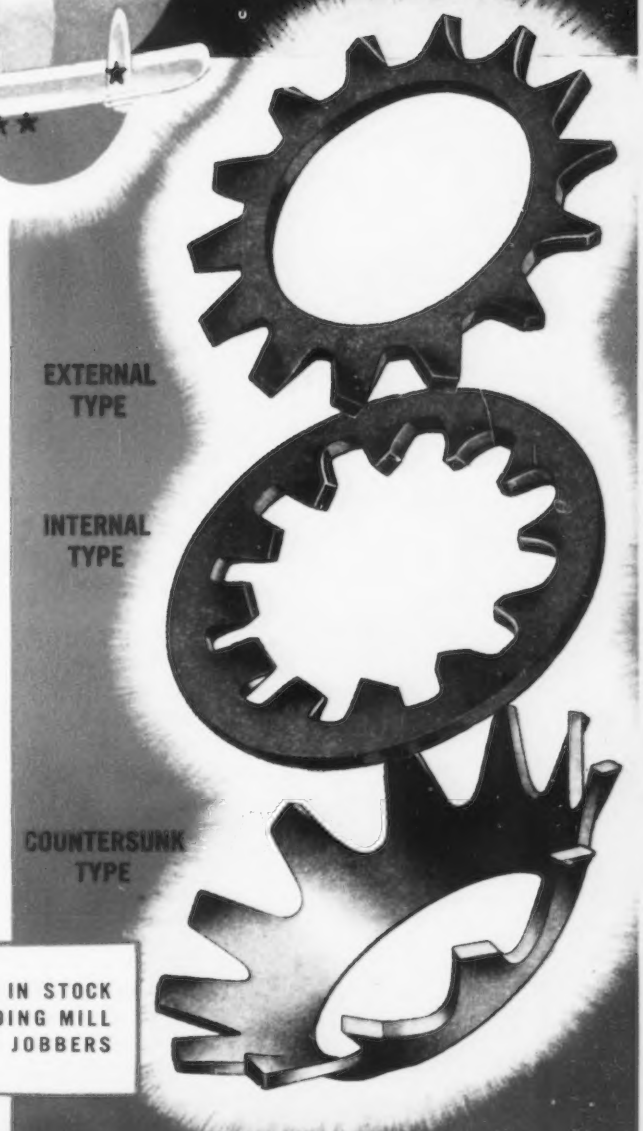

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Railroad Equipment Buying Awaits Upswing in Traffic

WASHINGTON—The railroads today can handle with the serviceable cars and locomotives they now own from 25 to 50 per cent more traffic than they are now handling. With all of the locomotives and cars awaiting repairs put in first-class condition, they can handle 45 per cent more traffic than they are now handling. Though modernization of the plant is by far the most important means of effecting savings, it can not be continued without restoring railroad credit, and credit can not be restored without an increase in the net revenue.

These points were emphasized by M. J. Gormley, executive assistant, Association of American Railroads in a recent address in Chicago. It was delivered before the administration announced its lending-spending program, which includes a plan for Government purchase of railroad equipment for lease and ultimate sale to the carriers. The remarks of Mr. Gormley, however, have a significant bearing on the administration's plan and would indicate that until there is a sharp rise in traffic with ensuing net returns, the railroads generally are not expected to be in the market for large blocks of equipment.

Depends on Interest

Running counter to this point is the argument that the issue revolves around the interest rate on loans. The contention is projected that if it is made low enough many railroads would be attracted to the plan. This is said to be true especially of railroads in bankruptcy, and, according to Mr. Gormley, 31 per cent of all railroad mileage or approximately 78,000 miles, is in the hands of the court. The thought is that court procedure for reorganization sets up a reduced financial structure by temporarily waiving bond interest and cutting other costs so that advantage can be taken of the process to acquire new equipment. Those who say the interest rate is largely the factor which would determine whether the carrier would purchase equipment speak of a rate lower than any that has been proposed so far. On lease of equipment they speak of 50c. per diem for each car, comparing with the usual rate of $1.

Nevertheless proposed legislation for railroad loans has developed comparatively little interest with few exceptions, and this despite a tentatively proposed rate of 2 per cent. Incidentally Jesse H. Jones, who has been confirmed by the Senate as Federal Loan Administrator, objected as head of the RFC to a 2 per cent rate. At the same time it is said that even this rate is greater than many railroads are willing to pay, in view of their poor earnings or lack of earnings. It is reported that Mr. Jones will not be the important figure in shaping the policies of the new loan administration that he was in directing the policies of the RFC. But if he is the railroads will not get an interest rate as low as 2 per cent unless he has changed his views on the subject. Whether or not he was responsible for reports that a rate of 2.75 per cent was under consideration is not known. Such a rate as the latter, it is claimed, would be

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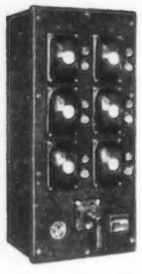

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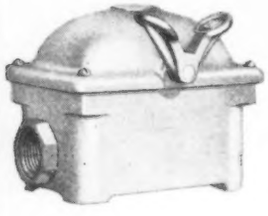

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entirely too high to insure any considerable success of a railroad program, which proposes an outlay of $100,000,000 for the fiscal year 1940 and $500,000,000 over a three-year period.

Loans Already Substantial

There is, of course, some concern over the obligations which the railroads already owe the Government and the further commitment that they would make in this direction under a leasing system. Whether wide of the mark or not there are those who think that unless the tendency is brought to an end Government control of the carriers may be threatened. This development is not seen as an early prospect but the fact remains that Government obligations have attained a sizable sum. On April 30, 1939, outstanding RFC loans aggregated $438,689,667.95. Total railroad loans made to that date since the RFC was set up in 1932 amounted to $638,135,661.06, while loans repaid aggregated $199,445,993.11.

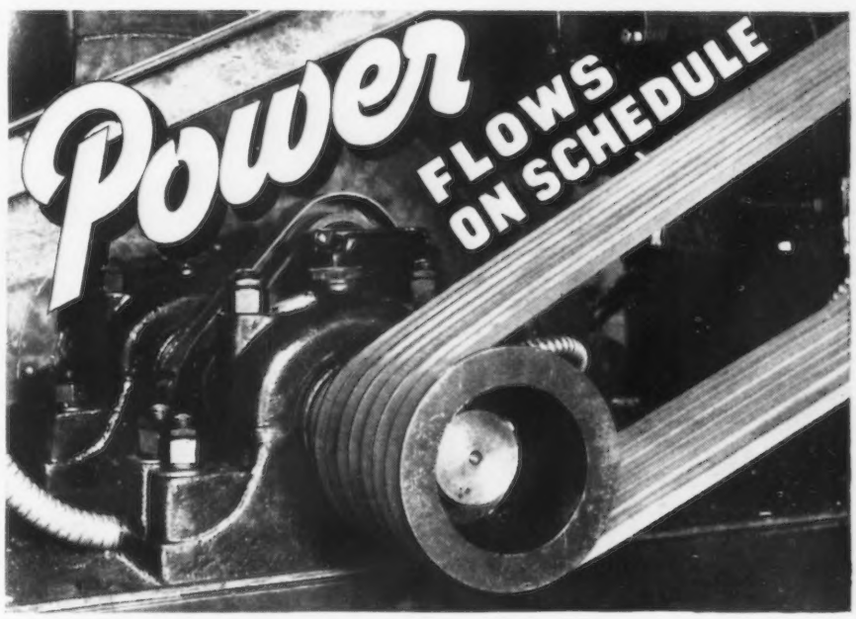
Objections also are being directed against other phases of the lending-spending program. One of them relates to the so-called self-liquidating toll roads, bridges and highways. Criticism is made that in reality they will not be self-liquidating.

More important to the railroads than loans is pending legislation, now in a jumbled condition, looking to the fixing of a national transportation policy. The railroads complain that they are closely regulated by the Federal Government and the states while they have to meet unregulated competition with other forms of transportation partially or wholly supported by the Government.

Savings in Modernization

Should they be given substantial relief, coupled with a sharp upturn in traffic yielding net returns, it is stated railroads would come into the market for large purchases of equipment, much of it to be financed by themselves rather than by the Government. Until then, it is doubted that they will do so. As a matter of needed economy, the railroads know from experience that the greatest savings lie in modernization of the plant. Records show that the carriers can move much more traffic with greater speed today with less equipment than they could in former years with a greater number of cars and locomotives. This was made clear by Mr. Gormley.

He pointed out that the passenger service has been greatly improved by air conditioning, general improvement in equipment and the adding of 88 new streamlined, high-speed trains. Freight service, he said, has been greatly improved as is best shown by the fact that the speed of freight trains since 1920 has been increased 61 per cent and the tons per train hour have been increased 109 per cent. Cost of operation per unit of traffic, he explained, has been greatly decreased. Specifically, the cost of moving a ton of freight 1000 miles in 1938 was $6.78 compared with $10.78 in 1921. Mr. Gormley pointed out that the railroads now own approximately 700,000 less cars and 23,000 less locomotives than they did at the high point of ownership, which was in 1925. The average tractive effort of locomotives in 1938 was 36 per cent greater than in 1920. It is estimated, he stated, that, by reason of the increased efficiency in movement, the traffic of 1929, the heaviest in history, could now be handled with from 300,000 to 350,000 less cars than were required at that time. Tons of fuel con-



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sumed by railroads in 1938 was nearly 42 per cent below that of 1920.

Improved Operations

"The accumulated decrease in cost for the fifteen years ended with 1938 is ten and three-quarter billions of dollars, made up of $3,210,000,000 from freight and $2,532,000,000 from passenger service," said Mr. Gormley. "From this it will be noted that the decrease in cost of operation approaches the decrease in the ton-mile receipts. This has been brought about by greatly improved methods of operation but principally by the money spent for improved locomotives and cars, signal systems and everything of this kind that increases the efficiency and decreases the cost."

Stating that railroad expenditures for the 16 years, 1923 to 1938, were $8,800,000,000, Mr. Gormley said this capital outlay is almost exactly offset by the decrease in freight costs alone. To get the net figure he deducted interest on the money spent for improvements. Calculating the cumulative interest at 4½ per cent, he said it would not greatly exceed the savings in passenger expenses.

"This clearly shows that the principal avenue for decreasing cost is through money spent for improvements, including new cars and locomotives, that will increase the efficiency of service and at the same time reduce the cost," Mr. Gormley said. "All other avenues, regardless of how desirable, that may be open for saving money, including consolidation and coordination, can be considered at best as only a small percentage of what can be saved be continuing modernization of the plant. This can not be accomplished without restoring railroad credit and that credit can not be restored without an increase in the net revenues."

Toll Roads "Traffic Repelling"

Meanwhile prospects for speedy approval of the proposed $750,000,000 program to finance self-liquidating toll roads and bridges appeared less bright, with a list of the suggested projects, mentioned at the White House when President Roosevelt sent his proposal to Senator Byrnes, still at large. Some reports have it that the Bureau of Public Roads was having difficulty making up a list of road projects although the agency, which is now the Public Roads Administration under the new reorganization move, would neither deny nor confirm the reports.

In a comprehensive analysis sent to Congress late in April, the Government roads agency called toll roads "traffic repelling" and said that, except for a 127-mile road between New Haven and Philadelphia, where it is estimated that annual toll collections for the year 1960 will slightly exceed the annual cost, toll roads were "out" as a paying proposition.

At the same time, members of the Senate who handle road legislation whenever highway construction is up for consideration, appeared to look with disapproval upon the President's road-building proposal. Senator McKellar, Democrat of Tennessee and chairman of the Senate Post Office and Post Roads Committee, characterized toll bridges as so unpopular that it would be "impossible" to do anything with them in the way of a self-liquidating works program. Similarly, Senator Hayden, Democrat of Arizona and ranking member of the committee, couldn't understand how toll roads and bridges could be financed under a self-liquidating program. These statements

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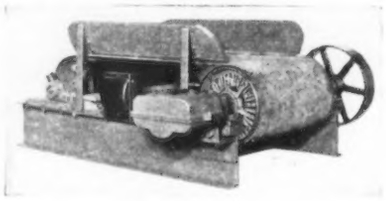

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were made two days before Mr. Roosevelt formally announced the rough details of his spend-lend program.

Interior Secretary Ickes, who was appearing before the Senate Appropriations Committee on the public works appropriations act for 1939, said at the time he had no inkling of the program except for newspaper stories but he readily agreed with Senator Hayden. Mr. Ickes has since lost his PWA post to John Carmody, new administrator of the Federal Works Agency.

Proceeds from All Steel Sales Couldn't Finance New Deal

WASHINGTON — If the steel industry were to turn over to the Federal Government all the money realized from gross sales during the nine calendar years ended in 1937 there would still be a great gaping hole of almost $9,000,000,000 in the national budget. During the nine fiscal years ended June 30, 1939, deficit spending increased the public debt by $24,000,000,000. Total gross sales of steel during the nine calendar years 1929-1937 aggregated $14,581,000,000. Gross sales of steel in 1938 amounted to $1,647,000,000. They were only about 16 per cent of expenditures made by the Treasury during the fiscal year ended June 30, 1939, when the all-time peace record of almost $9,300,000,000 was poured forth from Washington.

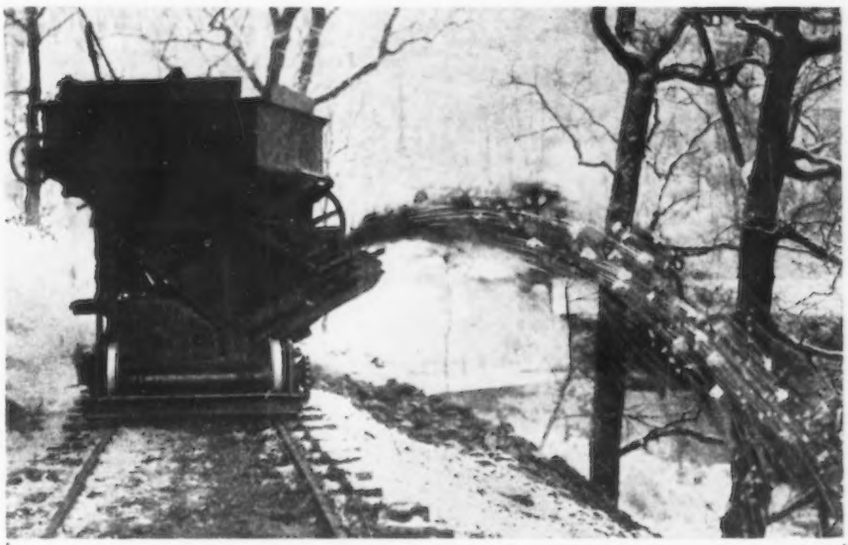
The record year of steel sales during the 1929-1938 period was in 1937 when they aggregated $2,738,000,000. Yet this would barely top the average annual Federal deficit of more than $2,500,000,000 during the last nine years. This is more than half of the average capital investment in the steel industry in the 1930-38 period. Though its pay is higher than that of the Government, the steel industry's salaries and wages of $613,000,000 for some 450,000 employees in 1938 are only about one-third of the Federal civil payroll of approximately $1,800,000,000 for some 900,000 employees. It would take almost 20 times the gross steel sales of $2,090,000,000 in 1936 to pay the Government debt.

Yet, in the face of these mounting deficits—and the New Deal has never seen anything but red ink—there are 11,000,000 unemployed, some 26,000,000 on relief, and preparations are being made for another mad spending plunge of $3,800,000,000 to bring about a recovery that is and promises to remain illusory under present Government policies.

In the face of this unwholesome picture, the New Deal already has launched a third term campaign. If it thinks it has a good chance for victory the drive for votes by the spending route will be pressed vigorously. Considering its appalling failure the ambition of the New Deal to perpetuate itself in power is puzzling millions.

$8,850,000 for Repairs To Five U. S. Battleships

WASHINGTON — Partial modernization of the battleships Tennessee, California, Colorado, Maryland and West Virginia at the Puget Sound, Wash., Navy Yard was approved last week by the Senate Committee on Naval Affairs when it recommended legislation authorizing $8,850,000 for repairs to the ships. The House voted the authorization.



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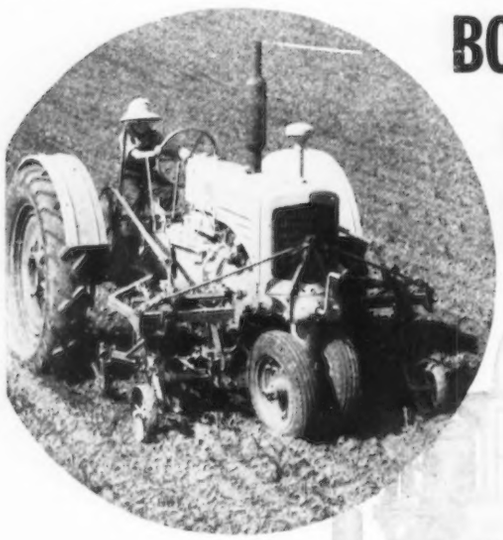
Aluminum Group Reaffirms Belief in Research Work

DECIDING that "the research and development work which has brought aluminum to the fore will be pursued through an ever widening field," the summer business meeting of the Aluminum Association was opened in Chicago on June 28 by H. B. Harvey, of the Harvey Metal Corp., Chicago, and Western vice-president of the association. "The aluminum industry," Mr. Harvey said in his opening address, "in spite of its extremely rapid growth, is on a sound basis. During the past decade the use of aluminum has spread into many fields of industry and has also become a dominant factor with the consumer."

A large attendance included such leaders of the industry as L. M. Brile, president of Fairmont Aluminum Co., and George Stanley and I. W. Wilson, vice-presidents of Aluminum Co. of America.

Various committee reports were read at the meeting and subjects of importance were discussed. It was decided to hold the association's next meeting in New York on Oct. 20.

The meeting was arranged by a committee consisting of H. B. Harvey, H. B. Harvey Co.; M. Weil, National Smelting & Refining Co.; A. J. Peterson, Advance Aluminum Castings Corp.; J. B. Westcott, Miller, Gorham, Westcott & Adams, and R. B. Whidden, Aluminum Co. of America. Officers of the association are: President, Charles B. Bohn, Bohn Aluminum & Brass Co.; chairman of the board, Arthur V. Davis, Aluminum Co. of America; Eastern vice-president, W. B. Golden, Reynolds Metals Co., and Southwestern vice-president, James J. Geraghty, Johnston Tin Foil & Metal Co.



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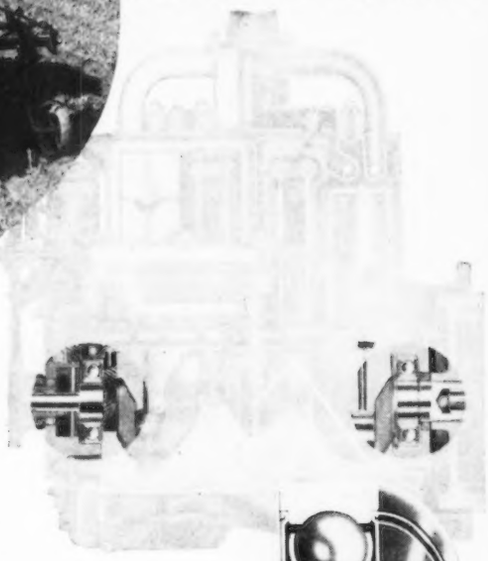

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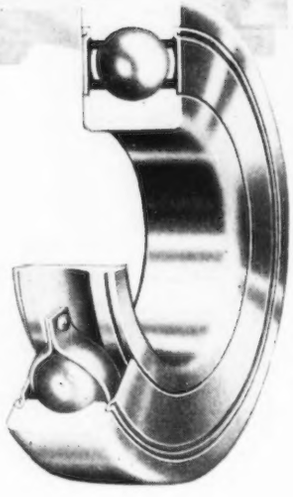

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of the N. A. Woodworth Co., which has taken over a plant at 9111 Schaeffer Highway, Detroit. The building, approximately two years old, is a modernistic structure with approximately 15,000 sq. ft. of floor space and contains a completely equipped machine shop. It formerly was operated by Partool & Machine Co.

Activities at the outset will be directed toward precision tool and machine work as well as machine tool work.

Associated with Mr. Woodworth are E. W. LaMonte, formerly general manager of Swartz Tool Products Co., and J. F. Benner, who was formerly with the predecessor company, Partool.

140 Disputes Settled By Toledo Labor Peace Board

TOLEDO—Fourth anniversary of the Toledo Industrial Peace Board on July 4 brought out the fact that the citizen board, now sponsored officially by the city, has settled 140 incipient labor disputes without any stoppage of work.

Edmund Ruffin, director of the board, reports that 28,441 employees were involved in these disputes. In the four-year period the board assisted in settling 47 strikes involving 6169 employees, and one lockout involving 100 persons Mr. Ruffin also was mediator in 49 disputes involving 4503 employees.

Many little disputes involving individuals also were brought to the attention of the peace board director and satisfactorily ironed out before they became source of larger disputes.

In all 235 disputes have come before the board in the four years and they involved 39,213 employees.

There are 18 members of the peace board—six from industry, six from labor ranks and six to represent the public. The board was an idea of Edward F. McGrady, then first assistant secretary of labor, and now the vice-president of the Radio Corp. of America. Cost of operation has averaged about $6685 a year.

Within the last week the board was instrumental in finding a solution to three strikes—cartage, a variety store and a garment plant. Toledo now has only one dispute pending (at the Gulf Refining plant). It is before the National Labor Relations Board.

Detroit Pipe Job Finally Goes to French Company

DETROIT—A contract to a French concern for 30,000 ft. of cast iron water pipe was formally awarded by the Detroit Common Council last week after the award had been a political issue for a month. The council voted five to three to accept the bid of Central Equipment Sales Corp., agent for the International Selling Corp., representing Pont-A-Mousson Co., Nancy, France. The council's action, in effect, sustained the veto of Mayor Richard Reading, who contended that an earlier attempt to award one third of the contract to the Lynchburg (Va.) Foundry Co. and two-thirds to the French company was a violation of charter provisions which require award to the low bidder on city contracts.

Globe Iron Announces New Cast Material

A PATENT covering a new cast iron alloy has been assigned to the Globe Iron Co., Jackson, Ohio, by the inventors, Edwin A. Jones and A. H. Dierker, general manager and metallurgist respectively of the company. Silicon and chromium are the principal alloying elements in the new cast iron. The material was developed for use at elevated temperatures. It is free from growth and scaling at temperatures up to 1500 F. and can be used at higher temperatures under proper conditions, the company says.

The material can be made in the cupola or electric furnace of the average foundry by using certain special grades of pig iron produced by Globe Iron. The material can be made at a low cost considering its mechanical properties and resistance to deterioration at elevated temperatures, according to Globe Iron Co.

A FEW *Famous* WHEELABRATOR *Firsts*

Accomplished Without COMPRESSED AIR OR PICKLING

first — First commercial installation to descale billets, sheets, rounds, etc.

first — First commercial installation to blast large castings on a mono-rail conveyor (as used for cylinder blocks, clutch housings, bath tubs, etc.)

first — First commercial installation to cut stove iron to get superior holding surface for enamels.

first — First to clean cylinder blocks without removing from cooling conveyor.

first — First to apply standardized equipment to all of the blasting operations in foundries, forge shops, heat treat shops, etc.

A WHEELABRATOR Special Cabinet Used for Cleaning Tractor Cylinder Blocks.

WHEELABRATOR SPECIAL CABINETS HAVE MADE CLEANING ROOM HISTORY

THE *American* FOUNDRY EQUIPMENT CO.
510 S. BYRKIT STREET
MISHAWAKA INDIANA

U. S. Led in Japanese Machine Tool Imports

THE United States was the principal source of imports of metal working machinery into Japan in 1938, according to the Bureau of Foreign and Domestic Commerce. Machine tool builders in this country accounted for $23,811,408 of the total value of the trade, which amounted to $35,540,986. Total imports showed a gain of 104 per cent over the figure of $17,450,440 in 1937. This represents the highest value for imports of such products from the United States for any year on record. It is quite probable that imports from the United States may be even larger in 1939 than last year since the statistics for the last quarter of 1938 and first quarter of 1939 show that the trade has been at the rate of about $2,285,000 per month.

Exports from Germany to Japan of metal working machinery were valued at $9,437,737 in 1938 compared with $3,788,825 in 1937. Germany was the principal supplier of metal working machinery to the Japanese market in 1934. Should European conditions improve to permit Germany to release more machine tool capacity for export purposes, it may be expected that the Germans will again play a more important role in this market. In fact, even during 1938, German metal working machinery exports to Japan increased 149 per cent.

The United Kingdom almost doubled metal working machinery exports to Japan in 1938, but supplied only 4.3 per cent of the trade as compared with 4.5 in 1937. Switzerland's exports were only 6 per cent above those of 1937 and that country's share of the market decreased from 4.2 per cent to 2.1 per cent.

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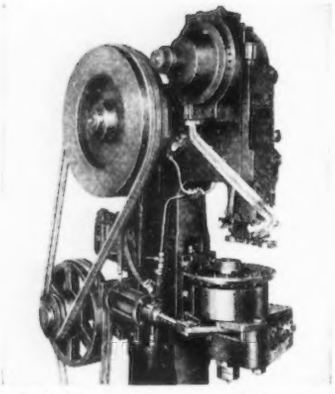
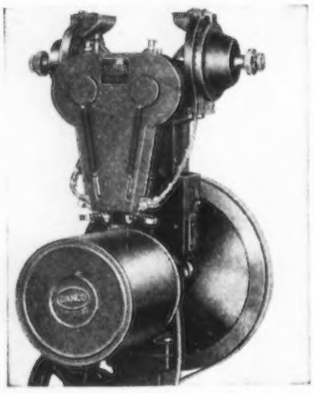


The Rivitor is shown here setting two solid rivets at a time to attach cushion springs to driven clutch plate assemblies. The plates are automatically indexed.



This Rivitor sets two rivets at the same time to attach handle brackets to paint pails.

to effect a stronger riveted joint at rates up to 3200 rivets an hour and at a saving by using the less expensive solid rivets.

You'll do your riveting smoothly, you'll do it automatically and with precision. The setting action is actually one of "coining". The motion proceeds from a fast approach to the riveting position to a slower setting action—giving the metal time to flow.

The Rivitor ably handles many jobs in many industries. Submit samples of your riveting jobs. We should like to show you the type of solid rivet joints that can be effected automatically. We should like you to realize the savings that you are always looking for so that you can offer a *better product for less.*

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Great Britain Importing Steel from Australia

LONDON—Substantial shipments of steel are now arriving in the United Kingdom from Australia, apparently to meet the exceptional demand for defense. More than 20 British tramp vessels have been chartered recently for similar cargoes aggregating nearly 170,000 tons. A considerable number of these cargoes consist of galvanized steel sheets for air raid shelters, which are to be distributed free to all house-owners earning less than $25 per week.

The steel has been purchased from the Australian Iron & Steel Co., a subsidiary of the Broken Hill Proprietary Co. This concern's production has expanded so greatly that it is able to deal with this export trade in addition to domestic business. As freight rates are now exceptionally favorable, landed prices after the 12,000-mile journey are only slightly above the official British Iron and Steel Federation schedule.

British Scrap Prices Stabilized to Oct. 31

LONDON—Present prices for iron and steel scrap are to be maintained in the United Kingdom until Oct. 31. This announcement was made following a conference between the National Federation of Scrap Iron and Steel Merchants and the British Iron and Steel Federation.

Diehl Mfg. Co., Elizabethport, N. J., electrical division of the Singer Mfg. Co., and pioneer manufacturers of electric motors, generators and ventilating equipment, has opened an office in the Johnston Building, Room 617, Charlotte, N. C. The office is in charge of James H. Lewis.

Firth-Sterling Acquires U. S. Rights to Produce "Cutanit"

McKEESPORT, PA.—A move to conserve tungsten during war-time periods, as well as to enhance the position of this metal and its alloys during peace-time preparedness, is seen in the recent acquisition of the American Carbide Alloys Corp. by Firth-Sterling Steel Co. here.

The acquired company has equipment and stocks of finished and raw materials at Lewistown, Maine, and Detroit. Firth-Sterling also takes over exclusive United States rights for the manufacture of "Cutanit," a cemented titanium carbide alloy, and, according to the company, one of the basic instruments of production in the present European arms race.

Use of this material in the manufacture of cutting tools in Europe, it is said, has grown from 9900 lb. in 1935 to 44,000 lb. in 1937, thus paralleling the increase in European armament production.

Output From Two Plants

The personnel of American Carbide Alloys is to be absorbed by Firth-Sterling. "Cutanit" will be produced at Detroit and at Firth-Sterling's plant here.

The primary value of "Cutanit," according to L. Gerald Firth, president of the Firth-Sterling firm, which makes high speed tool steels as well as tungsten carbide tips for cutting tools, is that present cemented tungsten carbide materials are given greatly increased efficiency for steel cutting by a percentage of titanium carbide, thus forming a "double carbide of tungsten and titanium." This double carbide is the basis of the "Cutanit" patents which have caused such widespread development in the use of cemented carbides for steel cutting in Europe.

In pointing out the difficulties surrounding the production and use of tungsten, Mr. Firth said: "Under normal peace time conditions, this country produced less than half of its total tungsten requirements. Under war conditions, we would fall far short of our needs.

Developed by European

"The mineral employed in the manufacture of 'Cutanit' is titanium, which is found plentifully in the United States. If the experience of Europe is repeated, its development will release a large portion of the tungsten now used in high-speed tool steels for other uses where tungsten is indispensable."

The titanium carbide composition is the invention of Dr. Paul Schwarzkoph, noted European metallurgist, whose plants in Austria and Germany, with affiliates in Great Britain and other European countries, have produced large quantities of the patented cutting material. Dr. Schwarzkoph is the sole owner of the basic patents in the titanium carbide field.

Nut and Bolt Institute Meeting at Alexandria Bay

CLEVELAND — The summer meeting of the American Institute of Bolt, Nut and Rivet Manufacturers will be held Thursday, July 20, at Edgewood-on-the-St. Lawrence, Alexandria Bay, N. Y.

1. Free-acting, flexible assembly can't bind, sag, warp or pull apart. More durable!

2. All-steel curtain repels fire, defies wind, weather, and burglary. Protection plus!

3. Because of its resilience, the door will absorb sharp impacts. More resistant!

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Justice Department Steel Study Results Due in Fall

WASHINGTON—The Department of Justice presentation of its study of the steel industry will be made before the Temporary National Economic Committee in the fall. Delay in getting returns from the two questionnaires the Department sent out has made it impossible to submit its material before the committee recesses for the summer. Returns from both forms now are in from virtually all the small steel companies and from most of the large producers. But after complete replies have been made it will require considerable time to coordinate, analyze and interpret the exhaustive data. Indications at present are that the department's steel study will follow examination of the oil industry which is expected to be the first study submitted when the TNEC convenes early in the fall.

The two steel questionnaires probably will be the only ones sent out. One (Form B) covers prices and distribution for February, 1939. The other (Form A) covers distribution for 1936-37-38. It was planned to send out a questionnaire on prices and distribution for May, 1937, and May, 1938, but the time element apparently will make it necessary to abandon these forms, though there still is a possibility that data for May, 1938, may be asked if it is thought the material can be obtained soon enough for its submission. However, the committee, owing to lack of funds, expects to close hearings early next year and to make recommendations to the next Congress unless it seeks additional appropriations to prolong its life. Under the resolution creating the committee it was the plan to continue its investigation until January, 1941.

Seeks to Show Contrasts

The Department of Justice had hoped to get the May, 1937-38, steel figures so that they might be compared with the February, 1939, data. May, 1937, had been selected because of the strong market and stable prices then prevailing. May, 1938, was chosen because of low operations and weak market and February of the present year was selected because it followed not only a break in prices but a change in pricing policy through the elimination of Pittsburgh differentials. The three months, each a mid-quarter month, when there were no overlapping contracts, were expected by showing contrasting conditions to reflect a cross-section of the industry on prices, production and distribution.

At the department it was stated that it hopes to adjust the hearings so that the steel industry will have an opportunity to present its case as completely as it desires. It was added that the industry now is engaged in assembling material sent to the department and is said to be supplementing it with its own study. Also it is reported that a large producer has a trained staff engaged in preparing its own material. It is the hope of the department that studies within the industry itself, will, among other things, show costs of production with relation to variations as to both capacity and operations.

The assumption is that material also will be submitted showing the actual effect on prices and distribution as the

THE PLACE TO BUY
HEAVY FORGINGS
Standard is a prompt source of supply for heavy forgings whether they be relatively simple like this 5,600 lb. forged ball drop or more complex like the 14,300 lb. forged crankshaft pictured here.
Standard's forgings and castings, too, are made from open hearth steel produced under close metallurgical control in our own furnaces.
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result of elimination of Pittsburgh differentials. Contrary to the easy contention of the Federal Trade Commission made before the TNEC that the wiping out of these differentials had no effect on competition, it is said that a factual study will show this change in pricing policy had a widespread effect on both quotations and distribution. The FTC, as a matter of fact, never made even a superficial study of the question, nor did it present any other new matter. It simply revived and intensified its attack on the basing point system. It is now generally conceded that the importance of the basing point system was considerably lessened by the elimination of Pittsburgh differentials.

Chicago Malleable Casting Co. Observes Its 40th Anniversary

CHICAGO—The Chicago Malleable Casting Co. last week celebrated its 40th anniversary. Company officials were proud of their record of 40 years' continuous operation and 40 years without a single strike. In addition, as of July 7 the company completed 1,000,000 man hours of work without a lost-time accident, nearly doubling the previous record for malleable foundries.

The average length of service of all employees is 12 years while the average service of the supervisory force is 18 years. When the company started in 1899 the original capital amounted to $100,000 while today there is more than $1,000,000 invested in the business. Among the customers there are 15 who have been on the books regularly for nearly 30 years. At present the company employs about 600 men. John T. Llewellyn is president.

Koppers to Make Fast's Multiple Oil Film Bearings

BALTIMORE — Exclusive United States license for the manufacture and sale of Fast's multiple oil film bearings has been acquired by Koppers Co. and these bearings will be produced by the company's Bartlett Hayward Division, here, Walter F. Perkins, vice-president, has announced. These bearings will become a companion product to the Fast's self-alining coupling which the organization has been manufacturing for many years.

Manufacturing rights and facilities have been obtained from the Fast Bearing Co., headed by Gustave Fast. Machinery is being moved to the Bartlett Hayward plant here where production will start soon.

This bearing, like the Fast's coupling, is self-alining and carries the load on an oil film which prevents metallic contact and wear and eliminates vibration and noise. A load-bearing oil film is automatically maintained over the full bearing surface, since each bearing is so designed that it acts as a centrifugal force feed pump, drawing the oil from a reserve supply in the bearing housing and returning it at the end of the cycle. The surplus oil acts as a cooling medium for the bearing surfaces, eliminating high local temperatures in the oil film.

It is stated that these bearings, in a sealed housing, will run continuously for a year on a single filling of oil. Load capacities are said to increase with speed, due to the intensified pumping action in maintaining the oil film. They also are said to provide high operating economy because of their long life, minimum depreciation and low oil consumption.

Ever since Oilgear pioneered the hydraulic broaching machine, it has led the way with a constant advance of outstanding developments both in fluid power and machine design.

Illustrated above is one such improvement. Already in the plants of leading industrials, the new Oilgear Horizontal Broaching Machines are providing increased production, at lower costs, with much less tool breakage and far longer tool life.

These machines provide variable cutting speeds up to 37 feet per minute and independently adjustable return speeds up to 100 feet per minute. They provide the most modern simplified push-button control, resulting in easier operation and less fatigue to the operator. Alternate to that, a toe lever switch frees the operator's hands for the work and the tool. In addition there is protection against overload and convenient emergency stop button. There is ample space for performing both internal and external broaching operations. Oilgear "DX" two-way variable displacement pumps with double solenoid pilot controls supply cushioned fluid power. All hand and foot levers, links, springs, pins, etc. required in previous control devices have been eliminated.

Oilgear Horizontal Broaching Machines are available in 9 sizes from 6000 to 100,000 lbs. normal broaching capacity; from 36" to 72" broaching stroke. 150% overload capacity increases the range from 9000 to 150,000 lbs. peak tool capacity.

In every way the new Horizontal Broaching Machines are characteristic of the advances in design and performance which have always made Oilgear the preferred equipment in leading plants. Write for further specifications. THE OILGEAR COMPANY, 1303 W. Bruce St., Milwaukee, Wisconsin.

OILGEAR

BROACHING MACHINES AND PRESSES

Ingot Output 18,629,927 Tons in First Half, 73% Over Year Ago

PRODUCTION during June of 3,130,381 gross tons of open-hearth and bessemer steel ingots brought total output for the first half of 1939 to 18,629,927 tons, according to the monthly report of the American Iron and Steel Institute.

The six-month total was 73 per cent greater than the total of 10,788,583 tons produced in the corresponding period of 1938.

Steel output in June was substantially above the May total of 2,917,876 tons, and was almost double the tonnage in June, 1938, when 1,632,843 tons was produced.

During June the steel industry operated at an average of 53.44 per cent of capacity, as against 48.24 per cent in May and 28.36 per cent in June of last year. Over the first six months of 1939 steel operations averaged 52.74 per cent of capacity, compared with 31.08 per cent for the similar period in 1938.

Ingot production averaged 729,693 gross tons per week in June, or 11 per cent above May when the average weekly output was 658,663 gross tons. In June, 1938, ingot production averaged 380,616 gross tons per week.

PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS
(Reported by Companies Which in 1936 Made 98.67 Per Cent of the Open-Hearth and 100 Per Cent of the Bessemer Ingot Production)

	Reported Production (Gross Tons)		Calculated Production All Companies		Number of Weeks	Per Cent of Capacity
1938	Open-Hearth	Bessemer	Monthly	Weekly		
January	1,612,469	99,941	1,734,165	391,459	4.43	29.17
February	1,551,082	125,443	1,697,452	424,363	4.00	31.63
March	1,821,935	157,687	2,004,204	452,416	4.43	33.72
1st Quarter	4,985,486	383,071	5,435,821	422,692	12.86	31.50
April	1,763,154	131,594	1,919,042	447,329	4.29	33.34
May	1,647,231	130,540	1,800,877	406,519	4.43	30.30
June	1,493,064	118,638	1,632,843	380,616	4.29	28.36
2nd Quarter	4,903,949	380,772	5,352,762	411,434	13.01	30.66
1st 6 Months	9,889,435	763,843	10,788,583	417,031	25.87	31.08
July	1,821,740	127,922	1,974,317	446,678	4.42	33.25
August	2,309,207	196,739	2,537,102	572,709	4.43	42.68
September	2,407,707	206,937	2,647,129	618,488	4.28	46.09
3rd Quarter	6,538,654	531,608	7,158,548	545,295	13.13	40.63
9 Months	16,428,089	1,295,451	17,947,131	460,183	39.00	34.29
October	2,844,450	223,158	3,105,985	701,125	4.43	52.25
November	3,312,475	201,196	3,558,363	829,455	4.29	61.81
December	2,932,272	158,912	3,130,746	708,314	4.42	52.79
4th Quarter	9,089,197	583,266	9,795,094	745,441	13.14	55.55
Total	25,517,286	1,878,717	27,742,225	532,072	52.14	39.65
1939						
January	2,986,455	147,494	3,216,653	726,107	4.43	53.18
February	2,710,696	196,186	2,982,011	745,503	4.00	54.60
March	3,115,022	194,694	3,396,021	766,596	4.43	56.14
1st Quarter	8,812,173	538,374	9,594,685	746,087	12.86	54.64
April	2,706,199	205,771	2,896,985	696,267	4.29	50.99
May	2,673,641	170,156	2,917,876	658,663	4.43	48.24
June	2,863,556	187,478	3,130,381	729,693	4.29	53.44
2nd Quarter	8,243,396	563,405	9,035,242	694,484	13.01	50.86
6 Months	17,055,569	1,101,779	18,629,927	720,136	25.87	52.74

Figures for 1938 and January through March, 1939, have been revised.

STATISTICALLY SPEAKING:

Half Year Construction Volume at New High . . . Electric Output Gains . . . Scrap Prices Higher

DUE entirely to the continued expansion in publicly financed construction activity, the volume of heavy engineering awards placed in the first six months of the present year was the highest of any first half volume since 1930, and was 24 per cent above the comparable period of 1938, according to *Engineering News-Record*. The total for the first half of $1,557,224,000, is made up of $1,173,076,000 in public contracts and $384,148,000 in private projects. The value of private contracts placed in the first half is the highest on record and 58 per cent above the like period of 1938, while private contracts were 21 per cent below the 1938 period.

Total contracts placed in June amounted to $262,395,000, or, on a weekly average basis, 17 per cent below May, but 18 per cent above June, 1938. Private awards were down 31 per cent from the May level and public work 19 per cent.

Dollar volume of residential building contracts let during the first six months of this year was greater than for any similar period since 1929, according to F. W. Dodge Corporation. The six months' contract total was $644,527,000, which was 61 per cent greater than the total for the first half of 1938, and 25 per cent greater than the total for the first half of 1937. Out of a $245,000,000 increase over the 1938 period, $181,000,000 represented the increase in private residential building and $64,000,000 measured the increase in public housing projects. All sections of the country participated in the residential building increases, with increments over the first half of 1938 ranging from 19 per cent in New England to 125 per cent in the Cleveland area.

Stronger markets in Philadelphia and Pittsburgh caused THE IRON AGE scrap price composite to rise to an average of $14.71 in June from $14.17 in May. In April the average was $14.77 and in June, 1938, was $11.32. The average finished steel composite price for June, however, was below the May figure, due to the lower prices prevailing on sheets and strip. The June average of 2.236c. per lb., compares with 2.256c. in May and 2.459c. in June, 1938. The month's loss was due to the fact that the recent break in prices occurred in the middle of May, giving that month the benefit of the higher prices for the first two weeks. The pig iron composite price remains unchanged at $20.61.

Both shipments and production of domestic slab zinc declined slightly in June, output dropping to 39,450 tons from 42,302 tons in May, and shipments declining to 37,284 tons from 39,607 tons in the preceding month. Domestic stocks at the end of June stood at 135,241 tons, a gain of 2166 tons from the May level, and equal to roughly about 3 or 3½ month's supplies at the present rate of consumption.

Domestic tin deliveries were also lower in June, the month's total of 4925 tons comparing with 5905 in May and 4205 in June, 1938. For the first six months of this year deliveries were 30,000 tons, or 3250 tons above the like period of 1938.

G-E Orders Up 32% In First Six Months

ORDERS received by General Electric Co. during the first six months this year amounted to $169,071,646, compared with $128,223,823 for the same period last year, an increase of 32 per cent, Gerard Swope, president, announced.

. . . THE NEWS IN BRIEF . . .

Jobs of 100,000 General Motors workers imperiled by strike of tool and die makers. . . . Assemblies due to head downward as changeover to 1940 models gets under way.—**Page 102.**

Ford Foundation housing project will take about 1500 tons of steel, to be furnished by Stran-Steel Division of Great Lakes Steel Corp.—**Page 105.**

Commerce Department talks with business seen as buildup for new bureau.—**Page 106.**

Congress completes legislation providing for War Department needs.—**Page 108.**

Training plane plant is projected for Pontiac, Mich., by Lennert Aircraft Corp.—**Page 109.**

Government orders for steel in week ended July 1 total $370,471.—**Page 109.**

Railroad equipment buying awaits upswing in traffic and revenues, rail association official says.—**Page 112.**

Senate group votes $8,850,000 for repair of five battleships.—**Page 115.**

Total proceeds from all sales of steel couldn't finance the New Deal's budget.—**Page 115.**

N. A. Woodworth, former Ex-Cell-O Corp. head, forms new company at Detroit.—**Page 116.**

Aluminum Association holds summer meeting at Chicago.—**Page 116.**

Detroit city pipe award finally goes to French company.—**Page 117.**

Toledo Labor Peace Board settles 140 disputes in four years.—**Page 117.**

Globe Iron Co. announces new cast material alloyed by silicon and chromium.—**Page 117.**

U. S. is chief source of Japan's metal working machinery imports.—**Page 118.**

British scrap prices are stabilized until Oct. 31.—**Page 118.**

Great Britain importing steel from Australia.—**Page 118.**

Bolt and nut makers' institute to meet July 20 at Alexandria Bay, N. Y.—**Page 119.**

Firth-Sterling Steel Co. acquires American Carbide Alloys Corp. and U. S. rights to produce "Cutanit."—**Page 119.**

Results of the Department of Justice steel study expected in fall.—**Page 120.**

Koppers Co. licensed to make Fast's multiple oil film bearings in U. S.—**Page 121.**

Chicago Malleable Casting Co. celebrates 40 years with a strike.—**Page 121.**

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MEETINGS

Aug. 28 to 31—American Mining Congress, Salt Lake City.

Sept. 20 to 22—National Industrial Advertisers Association, New York.

Sept. 26 to 29—Association of Iron and Steel Engineers, Pittsburgh.

Oct. 4 to 13—National Machine Tool Builders' Association, Cleveland.

Oct. 5 to 7—Society of Automotive Engineers, aircraft production meeting, Los Angeles.

Oct. 16—Society of Automotive Engineers, annual dinner, New York.

Oct. 23 to 27—National Metal Congress, Chicago.

Nov. 16 and 17—Porcelain Enamel Institute, New York.

General Electric Co. orders rise 32 per cent in first half of 1939.—**Page 122.**

Steel ingot output in first half totaled 18,629,927 gross tons, 73 per cent over first half last year; June was 11 per cent over May.—**Page 122.**

Half year construction volume at new high.—**Page 127.**

Mid-year meeting of Institute of Scrap Iron and Steel will be held in Cleveland, Aug. 28-29.—**Page 128A.**

William Cramp & Sons Ship & Engine Building Co. to reorganize, reopen shipyard.—**Page 128A.**

Bill requiring mention of country of origin in advertising revived by House Committee.—**Page 128A.**

U. S. Steel Corp. finished steel shipments rise 10,628 tons in June.—**Page 128B.**

International Harvester Co. announces new small tractor selling at $515.—**Page 128B.**

Basing points are attacked in Justice Department's drive against building trade restraints.—**Page 128C.**

Detroit tool and die shops vote a sympathy strike with UAW.—**Page 128D.**

Shenango Furnace Co. will buy Neville Island plant of Hunter Steel Co.—**Page 128D.**

Australia depends less on imports.—**Page 128D.**

Soviet tentatively orders $6,000,000 strip mill from Mesta Machine Co.—**Page 128D.**

Australia encourages home industry, depends less on imports.—**Page 128D.**

Pennsylvania Scrap Co. is organized at Philadelphia with Harry Kirchmann as president.—**Page 128D.**

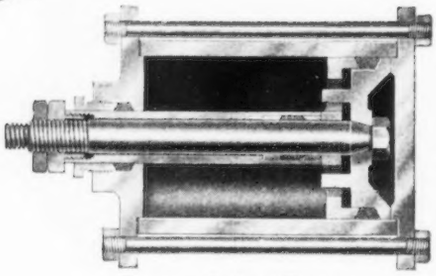
British speed up air-raid shelter output.—**Page 129.**

Labor Board rules for CIO against Essex Wire Corp., Highland Park, Mich.—**Page 129.**

Alabama pipe plant, closed since 1931, is scheduled to reopen Aug. 1.—**Page 130.**

Industrial building this year costs 8 per cent under 25-year average, Austin Co. finds.—**Page 130.**

MAXIMUM POWER!



Sectional View

Hannifin Air Cylinders (in all sizes and lengths of stroke) are bored and honed, giving a cylinder bore that is straight, round, perfectly smooth. Simple outside adjustment of the soft, graphite treated piston packing allows easy maintenance of perfect piston seal. Leakage is prevented and friction loss kept at the minimum.

For high efficiency use of air power, investigate Hannifin Air Cylinder advantages. Write for Bulletin 34-A with complete specifications.

HANNIFIN MANUFACTURING COMPANY
621-631 South Kolmar Ave., Chicago, Illinois
ENGINEERS • DESIGNERS • MANUFACTURERS
Pneumatic and Hydraulic Production Tool Equipment

HANNIFIN "Leak-Proof" AIR CYLINDERS

ALLOY HY-TEN STEELS

ALLOY S. A. E. STEELS

Immediate Shipment from Six Warehouses

Reduce your tool and die costs with HY-TEN "M" TEMPER, .70 CARBON CR-NI-MOLY oil hardening alloy steel. Extreme toughness at high degrees of hardness. Rounds, squares and flats in stock. Forgings of all types.

Send for descriptive folder

WHEELOCK, LOVEJOY & CO., INC.

CAMBRIDGE CLEVELAND CHICAGO NEWARK DETROIT BUFFALO

. . PERSO

C. S. REDDING

CHARLES S. REDDING, who joined the Leeds & Northrup Co. in 1909 a short time after his graduation from the University of Pennsylvania and who has been vice-president in charge of research and engineering since 1928, has been elected president of the company, succeeding MORRIS E. LEEDS, who has become chairman of the board. Mr. Redding has held executive positions in every division of the company. He became second vice-president in 1918, was treasurer from 1922 to 1924 and became vice-president in charge of research and engineering in 1928.

Mr. Leeds founded the company in 1899 to manufacture electrical measuring instruments and holds a number of patents on measuring instruments, for which he received the Edward Longstreth Medal of Merit of the Franklin Institute in 1920. He was graduated from Haverford College in 1888.

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ALLEN D. GUTCHESS, president of DeVilbiss Co., Toledo, Ohio, has been elected president of the Toledo Chamber of Commerce.

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A. C. CHILDS has been appointed general manager of sales of all Weirton Steel Co. products. W. A. FANNIN has been appointed to succeed him as manager of sales of the strip and strip

NALS . . .

M. E. LEEDS

sheet division. They will make their headquarters at Weirton, W. Va.

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B. M. HORTER, who has been in charge of the resale sales division of Cutler-Hammer, Inc., Milwaukee, has been appointed general sales manager of the company. He first became associated with the Cutler-Hammer Co. as a sales engineer in the Philadelphia territory. In 1921 he was transferred to the Wilkes-Barre territory and later was appointed manager of the New England sales territory.

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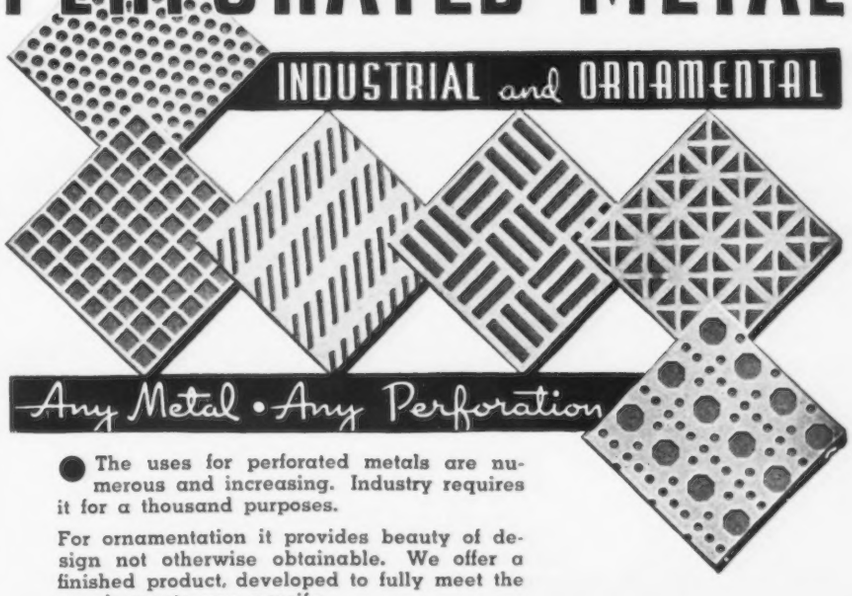
JOHN F. THOMAS, recently affiliated with Braun & Co., business consultants, as manager of the New York office, has been appointed vice-president in charge of sales of the National Enameling & Stamping Co., Milwaukee. He is a graduate of the University of Minnesota, and received his M.B.A. degree from the Harvard Graduate School of Business Administration. He has been a member of the public relations committee of the National Association of Manufacturers.

EMMETT G. GARDNER, who joined the company as factory manager of the Milwaukee plant early this year, has been appointed vice-president in charge of manufacturing. He was formerly associated with the Grand

PERFORATED METAL

INDUSTRIAL and ORNAMENTAL



Any Metal • Any Perforation

● The uses for perforated metals are numerous and increasing. Industry requires it for a thousand purposes.

For ornamentation it provides beauty of design not otherwise obtainable. We offer a finished product, developed to fully meet the requirements you specify.

The Harrington & King PERFORATING Co.

5657 FILLMORE STREET—CHICAGO, ILL.
New York Office, 114 Liberty Street

Whatever your spring requirements, whether for flat, coil or special types, from steel, brass, bronze, or alloys, you'll find Gibson Springs outstanding in all respects. Only a large, well-equipped plant can produce such quality springs at regular prices. Let Gibson quote on your next order.

Send your specifications to

WILLIAM D. GIBSON CO.

DIVISION OF ASSOCIATED SPRING CORP. 1800 CLYBOURN AVE., CHICAGO, ILL.

SPRINGS • WIRE FORMS • SMALL STAMPINGS

Rapids Brass Co. and has had a long experience in installation of wage and incentive plans, as well as in production control problems.

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FREDERIC M. DARNER, who has been chief engineer of Steel & Tubes, Inc., has been promoted to the post of assistant engineer of Republic Steel Corp. Cleveland. Mr. Darner will be assistant to C. A. Thayer, and his duties will be concentrated chiefly on the problems of the corporation's subsidiaries and divisions. A graduate of Case School of Applied Science in 1922, Mr. Darner worked with the American Rolling Mill Co. and as chief engineer of the Erie Malleable Iron Co. He has been with Steel & Tubes, a Republic subsidiary, since 1933.

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S. HORACE DISSTON, vice-president and general manager of Henry Disston & Sons, Inc., Philadelphia, has been elected president, succeeding Henry Disston, who has become chairman of the board.

WILLIAM D. DISSTON becomes vice-president in charge of purchases, sales engineering and new products development.

JACOB S. DISSTON, JR., who since 1933 has had charge of sales and sales promotion, continues in charge of these activities.

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E. W. DANY has been named chief engineer of the Ferro Enamel Corp., Cleveland.

HARRY NEE has returned to the Cleveland engineering department of Ferro Enamel Corp. after three years in the engineering department of the company's plant in England.

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WILLIAM O. LIPPMAN, who became identified with the Westinghouse Electric & Mfg. Co. after his graduation from Pennsylvania State College in 1918, has been appointed works manager of the East Springfield, Mass., works of the company. During his association with the Westinghouse company he has been supervisor of the inspection and testing department of the East Springfield works and has been in charge of the industrial relations department. Prior to his present appointment, he was superintendent of the air conditioning division at East Springfield.

F. M. DARNER

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N. B. ORNITZ, a director and a vice-president of Blaw-Knox Co., Pittsburgh, has been elected president of the American Gas Service Co., an affiliate of Blaw-Knox. L. W. JOHNSON has been appointed sales manager, LEO WARD, superintendent of construction and service, VINCENT EVANS, chief engineer, EDWARD A. MAYER, assistant treasurer, and HOWARD PHILLIPS, credit manager.

W. O. LIPPMAN

SPRINGS
FOR EVERY MECHANICAL NEED
COIL SPRINGS
FLAT SPRINGS
WIRE SPECIALTIES
WIRE FORMS
STRICT ADHERENCE to specifications is a fundamental policy of "American." When you buy American springs, you can be sure that each individual spring will be made in exact accord with your original design—to specified dimensions, tolerances, strength and resiliency.
SNAP RINGS
LOCK SPRINGS
SPECIAL SPRINGS
from Every Type of Wire up to & including ½ dia.
Send for Quotations
AMERICAN SPRING
AND MANUFACTURING CORPORATION
PARK AVE. HOLLY MICHIGAN

S. H. DISSTON

WILLIAM B. MAYO, former chief engineer of Ford Motor Co., has been appointed to the City Plan Commission by the mayor of Detroit. Mr. Mayo formerly was a member of the Street Railway Commission.

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W. A. BROWN, of Chicago, has been elected chairman of the board of Service Caster & Truck Co., Albion, Mich. WALTER C. PEAK, of Albion, former secretary-treasurer, has been advanced to the presidency to succeed Mr.

E. W. DANY

Carey BUILT-UP ROOFS Cut Overhead Costs

With nearly a half century's experience in the manufacture and application of roofing, Carey knows built-up roofs and all their problems . . . knows how to build extra years of service into them.

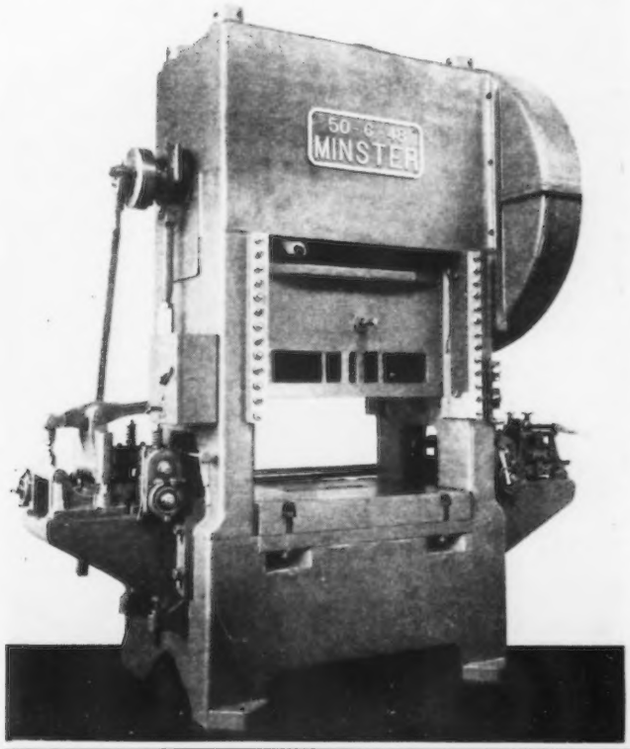
Whatever your roof needs, put the job up to Carey. It will be intelligently engineered and skillfully executed, in minimum time and at the lowest cost consistent with bonded quality.

ASPHALT — ASBESTOS — MAGNESIA

Roofing . . . Flooring . . . Insulations . . . Roof Coatings and Cements
Waterproofing Materials . . . Expansion Joint . . . Asbestos Paper and Millboard

THE PHILIP CAREY COMPANY · Lockland, Cincinnati, Ohio
Dependable Products Since 1873
BRANCHES IN PRINCIPAL CITIES

A *Minster* DOUBLE CRANK STRAIGHT SIDE PRESS

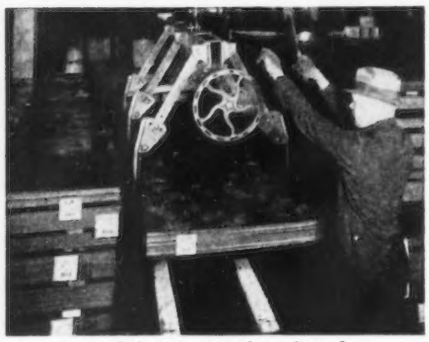


having 135 tons capacity, controlled with a combination air operated clutch and brake, equipped with Double Rack and Pinion Roll Feed, five roll power driven straightener and scrap cutter, operated at 50 strokes per minute, feeding steel through progressive dies, requiring 6 stations to finish the parts.

Write for the new 50 Series Bulletin today

THE MINSTER MACHINE CO., Minster, Ohio

IT'S EASY TO HANDLE SHEET STEEL



5 ton Lifter in manufacturing plant

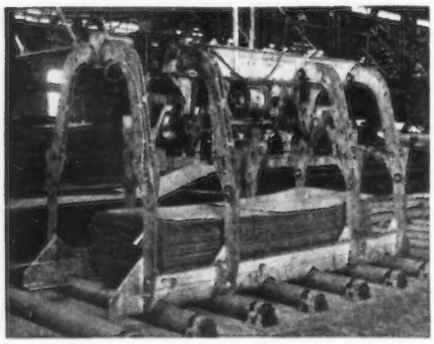
C-F SHEET LIFTERS

SAFER
Tong action and automatic take up safely grip loads. End control protects operator.

BETTER
High grade stock handled without surface scratches or damage to edges.

CHEAPER
Handle packs of sheet steel instead of single sheets. Sheet storage room reduced.

FASTER
Jaw adjustment made in a few seconds. One man control.



20 ton cap. Lifter in 80" strip mill

Also made for handling tinplate, ingot molds, paper rolls, pipe, tubing, castings, tote boxes, flasks, skids, etc. Capacities 2 to 60 ton. Special designs to suit your requirements.

Write for bulletin SL-14.

CULLEN-FRIESTEDT CO.
1303 S. Kilbourn Ave.
Chicago, Ill.

Locomotive Cranes, Car Pullers, Buckets, Welding Positioners

Brown. W. B. LACKEY, assistant secretary, is the new secretary of the firm. E. F. VACIN and HOWARD RILEY have been appointed treasurer and assistant treasurer, respectively.

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C. C. CONNER, assistant advertising manager, Aluminum Co. of America, Pittsburgh, was elected president of the Pittsburgh Advertising Club at its annual meeting last week, and FRED W. PENNINGTON, of the Westinghouse Air Brake Co., was elected vice-president.

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C. C. LIMBOCKER, heretofore president of the Wolverine Tube Co., Detroit, has been elected chairman of board, and H. J. HOOKS, secretary and treasurer for the past 20 years, has been made president. G. R. ANTHONY has been elected vice-president; O. Z. KLOPSCH, vice-president and general manager; J. D. COLYER, vice-president in charge of sales, and V. D. HANNA, secretary and treasurer.

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HENRY T. LINTOTT, who has been assistant general superintendent since 1929 of the Torrance plant of Columbia Steel Co., San Francisco, has been made general superintendent. He studied mechanical and electrical engineering at the University of Nevada and served as assistant chief electrician of the Pacific Coast Steel Corp. from 1917 to 1922. He then became affiliated with the San Francisco office of Lincoln Electric Co. and joined Columbia Steel Co. in 1928.

E. M. STEPHENS who has been associated with the steel industry since 1928 when he joined the Chicago Bridge & Iron Co. shortly after graduation from the University of Illinois, has been made manager of industrial relations of Columbia Steel Co. He succeeds B. M. Brock, who has been transferred to the United States Steel Corp. of Delaware. Mr. Stephens became associated with the United States Steel Corp. in 1933 as an assistant in the office of the vice-president in charge of sales in New York and joined the industrial relations department in 1936.

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EMMETT J. FALLON has been elected president and a director of the Pettibone Mulliken Corp., Chicago. Mr. Fallon was formerly connected with the Des Moines Foundry & Machine Co., and the Grinell Washing Machine Co.

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ADDISON B. HALL, head of the metal department of National Lead Co., was tendered a testimonial dinner at the Hotel Biltmore, New York, on June 27, on the occasion of his fiftieth year in the metal business. The dinner was sponsored by the American Tin Trade Association, of which Mr. Hall has been president for 10 of its 11 years of existence. Among those who paid tribute to Mr. Hall at the dinner were JOHN HUGHES, retired head of the tin department of United States Steel Corp.; JAMES E. POPE, Pope Trading Corp.; F. W. ROCKWELL, president, National Lead Co.; CHARLES SLAUGHTER, president, Commodity Exchange;

L. M. CURTISS, whose appointment as general superintendent of Lukens Steel Co., Coatesville, Pa., was announced in this column last week.

W. D. LONG, Caswell Strauss & Co., and EDWIN GROVES, James W. Phyfe & Co. Mr. Hall was presented with a silver bowl on behalf of the association.

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M. M. BECKWITH, for the past three years in charge of the chemical laboratory of the Guide Lamp Division of General Motors Corp., has joined the metal cleaning department of the J. B. Ford Sales Co., Wyandotte, Mich. He received his Ph. D. degree from the University of Illinois and was the co-author of the article on "Rochelle Salts—Cyanide Copper Plating Baths," which received the 1938 Proctor Award from the American Electro-Platers Society.

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C. E. LIVINGSTON has been made manager of the media department of Ketchum, MacLeod & Grove, Pitts-

burgh, succeeding HOMER L. ANDREWS, who has resigned to become district manager of *Architectural Record*. Mr. Livingston formerly was with Standard Statistics.

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GEORGE SCHAEFER, formerly rolling mill design engineer of Farrel-Birmingham, Inc., Ansonia, Conn., has been appointed manager of the rolling mill machinery sales division to succeed NORMAN SHAW. Mr. Shaw has been appointed manager of the company's Chicago office, located at 1059 First National Bank Building, Chicago. He will succeed HARRY TEMPORAL, who is being transferred to the Buffalo division. EDWARD S. COE, who has also been connected with the Chicago office, is being transferred to the rolling mill machinery sales division in Ansonia.

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ARCHIE J. WEITH, director of research and development, Bakelite Corp., 230 Grove Street, Bloomfield, N. J., has been appointed chairman of the insulation committee of the American Electrochemical Society.

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A. F. COLLING, for many years manager of the purchasing department of the Texas Co., New York, has retired. He has been identified with the company since 1910.

W. F. MOORE has been appointed to succeed Mr. Colling as head of the purchasing department.

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CHARLES H. BEARD has been appointed general traffic manager of the operating companies of the Union Carbide & Carbon Corp., New York.

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J. T. GILLESPIE, JR., formerly assistant manager of the Central division of railroad sales of Air Reduction Sales Co., Chicago, has been made assistant to THOMAS B. HASLER, president of the Wilson Welder & Metals Co., Inc., an affiliate of Air Reduction Sales Co., New York. Mr. Gillespie is to handle promotional sales activities in cooperation with I. B. YATES, general sales manager of the Wilson company.

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H. J. BABCOCK has joined the engineering staff of Ferro Enamel Corp., Cleveland. For the past six years he has been technical consultant for the Tennessee Electric Power Co.

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SAM FOX, former general sales manager for the Mosler Safe Co., and at one time sales manager of the Record Protection division of Remington-Rand, has been appointed general manager of the Steel Storage File Co., Cleveland.

. . . OBITUARY . . .

ROBERT E. AHERN, sales manager, Cleveland Pneumatic Tool Co., Cleveland, died of a heart attack June 30 while on a business trip in Birmingham. He joined the company in 1919 as manager of the St. Louis office and went to Cleveland as sales manager in May, 1934. He was 48 years old.

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HENRY HYER WHITING, retired Pacific Coast steel man, died July 6 in Berkeley, Cal., after a four months' illness. He was 64 years old. Mr. Whiting began his career in the steel business in San Francisco in 1907, rising to become treasurer of Columbia Steel Co., and later vice-president and general manager of General Metals Corp., which he founded. He retired in 1933 and since that time had been director of the Central Bank of Oakland.

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MOSE COHEN, head of Mose Cohen & Son, dealers in scrap iron and steel in Cincinnati, died at his home in Cincinnati, July 2. Mr. Cohen was 63 years old and had been active in the scrap business in Cincinnati for 35 years.

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WALTER K. BLAKESLEE, an engineer for the Fisher Body Co., Detroit, died July 7. Mr. Blakeslee was born in Greigsville, N. Y., in 1879. He was a member of the Engineering Society of Detroit.

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CHARLES E. BAUMHECKEL, SR., chairman of the board of the Forbes Varnish Co., Cleveland, was buried July 5 at Detroit. Mr. Baumheckel was born in Dayton in 1856 and had lived in Detroit and its vicinity for more than 30 years.

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JOHN K. BEEBER, an engineer for Lukenweld, Inc., Coatesville, Pa., was killed in an automobile accident last week.

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HERBERT J. CONN, 70 years old, who retired 10 years ago from the Manufacturers Screw Machine Products Co., was buried June 29 at Detroit. He had lived in Detroit 50 years.

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JOHN RUSSELL, formerly prominently identified with the New England foundry industry, died on July 7 in a Plymouth, Mass., hospital. Mr. Russell was born Jan. 26, 1860, and was graduated from Harvard University with the class of 1882. Shortly afterwards he became associated with the Woburn Iron Foundry, Woburn, Mass., and later became treasurer and then manager.

Cramp Shipbuilding Firm to Reorganize

PHILADELPHIA—William Cramp & Sons Ship & Engine Building Co., Philadelphia, operated by American Ship & Commerce Corp., 39 Broadway, New York, is completing plans for reorganization and reopening of the shipbuilding plant at Richmond and Norris Streets, idle for several years. The new company will arrange for an operating capital of about $4,000,000 and the plant will be modernized and equipped for construction of cargo carriers and other large vessels, with resumption of operations scheduled in about six months. Facilities will be provided for employment of close to 5000 men.

Mid-Year Scrap Meeting Aug. 28-29 at Cleveland

THE mid-year meeting of the board of directors and members of the Institute of Scrap Iron and Steel, Inc., New York, will be held in Cleveland, Aug. 28-29, according to an announcement by Joseph E. Jacobson, Pittsburgh, president of the institute.

"Country of Origin" Advertising Measure Is Reviewed

WASHINGTON—A bill requiring manufacturers and distributers to mention the country of origin in advertising and labeling products whose major component part is imported has been revived by a House Interstate Commerce Sub-committee. Although the measure was regarded earlier in the session as standing little chance of receiving action, the sub-committee has voted to hold two days of public hearings, with proponents and opponents each being allocated two hours for arguments.

Sponsored by Representative J. Harold Flannery, Democrat of Pittston, Pa., the bill would make it unlawful to distribute goods or to disseminate advertising concerning products without first indicating in labels or in advertising matter the country producing the major component part of the fabricated product. Some 20 complaints against the measure have been filed with the sub-committee, and most of these point out that such a law would be next to impossible to administer.

New Small Tractor Shown By International Harvester

CHICAGO—A new small tractor, the Farmall-A, was shown publicly for the first time on Wednesday by the International Harvester Co. at its tractor works in Chicago. Equipped with standard-size rubber tires, this tractor will sell for $515, as against $585 for the Ford tractor (announced in the July 6 issue of THE IRON AGE), with which it will compete.

The new machine weighs approximately 1700 lb. and was designed to serve two farms needs—to furnish complete tractor power for smaller farms and small-acreage truck farms, and to do the lighter work on large farms as a supplement to bigger tractors already in use.

Sydney G. McAllister, president of the harvester company, who showed the new tractor to the assemblage of newspaper men, farm and technical journalists and a group of professors from agricultural colleges, emphasized that the company had put into the development of the Farmall-A all the knowledge, engineering technique and field experience gained in American and foreign farming operations in more than three decades of tractor manufacture. It has been developed and tested, he said, to meet farming conditions in every part of the country—the blacklands of Texas, the Imperial Valley of California, the cotton country of the Southeast and the Middle West's corn belt.

Tried by Dirt Farmers

"We didn't put it in the field to be babied along tenderly by our own testing forces. We put tractors in the hands of regular dirt farmers. They paid us for them, so that the machines became theirs. They used them as they pleased and told us what they thought of them. We know what this tractor will do, not only under favorable conditions, but under any conditions. . . ."

The tractor is said to operate under a full load with a mixmum fuel consumption of approximately one gal. per hr. on either gasoline or distillate. An outstanding feature is the location of the motor and the operator's seat. The motor is offset to the left of the long axis of the tractor, while the operator's seat is placed to the right. Described as "Culti-Vision," this construction is of great value to corn, vegetable and other farmers who plant their crops in rows and who will use the tractor to cultivate the rows of growing crops. The operator can see his work at all times, and does not need to lean sidewise, or to guess.

Adjustable rear-wheel treads permit the operator to set his rear wheels to fit the width of his rows. Four forward speeds are available, three of which are for field operation and the fourth for farm and highway travel or hauling. Speed may be regulated as low as 1½ miles per hr. for cultivation of such as delicate vegetable crops, up to the top speed on the highway of 10 miles an hour.

Has 7000 Dealers

A new line of implements, including cultivators, plows, planters, middle busters, mowers, etc., will be marketed, all of a size and design to fit the new Farmall-A. Special attachments, such as equipment for the use of distillate as fuel, belt pulley, power take-off, lighting system for night operation, muffler, swinging drawbar, and others are also available.

The company has over 7000 tractor dealers, Mr. McAllister said, as he pointed out that they are now in production on the small machine and that it is rising rapidly. "Our problem for several months is going to be to produce enough of the new tractors to fill the orders." The stepping up of production schedules at the Chicago tractor works will mean the recalling of employees gradually from week to week, with maximum employment hoped for by autumn.

The four-cylinder engine will pull a 16-in. plow bottom or a one-row middle buster. It has replaceable cylinder sleeves, Tocco-hardened crankshaft, overhead valves, precision bearings, and a variable speed governor giving engine speeds of 900 to 1400 r.p.m. with full throttle at any speed. The engine has a 3-in. bore and 4-in. stroke. Maximum drawbar horsepower is 12 and belt horsepower is 15, while rated drawbar horsepower (75 per cent of maximum) is 9 and rated belt horsepower (85 per cent of maximum) is 12.75. Wheelbase of the Farmall-A is 70 in., length, 106 in. and turning radius, with rear wheels set to 40-in. tread, 9 ft.

U. S. Steel Shipments Up 10,268 Tons During June

UNITED STATES STEEL CORP. subsidiaries shipped 733,433 tons of finished steel products in June, compared to 723,165 tons in May, an increase of 10,268 tons, and to 478,057 tons in June, 1938, a gain of 255,376 tons. For the first half of 1939 shipments totaled 4,393,266 tons compared with 3,010,354 tons in the first half of 1938.

MONTHLY SHIPMENTS OF FINISHED STEEL PRODUCTS BY UNITED STATES STEEL CORP.—TONS

Month	1935 Shipments	1935 Per Cent of Capacity	1936 Shipments	1936 Per Cent of Capacity	1937 Shipments	1937 Per Cent of Capacity	1938 Shipments	1938 Per Cent of Capacity	1939 Shipments	1939 *Per-Cent of Capacity
January	534,055	31.9	721,414	44.8	1,149,918	75.4	518,322	33.7	789,305	51.8
February	583,137	39.2	676,315	45.3	1,133,724	82.5	474,723	35.5	677,994	49.3
March	668,056	41.5	783,552	50.5	1,414,399	92.7	572,199	37.2	767,910	50.4
April	591,728	36.7	979,907	63.2	1,343,644	91.0	501,972	33.7	701,459	47.5
May	598,915	35.8	984,097	63.4	1,304,039	85.5	465,081	30.2	723,165	47.4
June	578,108	36.7	886,065	57.1	1,268,550	85.8	478,057	32.1	733,433	49.7
July	547,794	34.0	950,851	61.3	1,186,752	77.9	441,570	28.8	.....	...
August	624,497	37.3	923,703	59.6	1,107,858	72.6	558,634	36.3	.....	...
September	614,933	39.7	961,803	62.0	1,047,962	71.1	577,666	37.5	.....	...
October	686,741	41.1	1,007,417	62.6	792,310	52.0	663,287	43.1	.....	...
November	681,820	42.3	882,643	59.2	587,241	39.7	679,653	45.6	.....	...
December	661,515	42.7	1,067,365	68.8	489,070	32.1	694,204	45.2	.....	...
Minus yearly adjustment	(—23,750)	...	(—40,859)	...	(—77,113)	...	(+30,381)	...	.....	...
Total for year	7,347,549	38.1	10,784,273	58.2	12,748,354	70.4	6,655,749	36.7	.....	...

*Annual finished steel capacity 17,940,600 gross tons, with monthly percentages based on actual number of weeks in each month.

Arnold Blames Basing Points In Building Restraint Attack

WASHINGTON — Basing point systems and zone price systems are included in the objects of attacks by the Department of Justice in the nationwide anti-trust prosecutions it is preparing to launch simultaneously against restraints of trade in the building industry. This was disclosed by Thurman W. Arnold, Assistant Attorney General, in testimony last Friday before the Temporary National Economic Committee when he presented the most elaborate "trust busting" campaign ever undertaken. It will be directed, he said, against all types of restraints in the building construction industry. The campaign, he stated, will be unique, in attacking some state laws and municipal ordinances as being as much responsible for the high cost of buildings as what he called the price-fixing policies of labor, manufacturers and distributors.

Comment has been made that more unusual than an attack on state and municipal laws is the plan to make a drive against organized labor and there is widespread speculation whether it really will be prosecuted vigorously. This conjecture arises from the fact that the Administration has always coddled labor and that it will not endanger strong political support by putting it on the legal grill. There is no doubt as to the sincerity of Mr. Arnold's readiness to sweep labor in his antitrust dragnet. Nevertheless, there is skepticism that he will be permitted to press the case against labor. While he may be allowed to make false passes at prosecutions, the view has been expressed that when it comes to earnest efforts he will face restraints both from the White House and his own chief, Attorney General Murphy, whose record as governor in connection with sit-down strikes strongly reflects his excessive pro-labor bias and his political fear of labor. However, Mr. Murphy had previously announced that the Department of Justice would proceed against building restraint.

It may be pointed out that if labor does escape serious prosecution the case which Mr. Arnold says has been built up will be vastly weakened since much of it is based upon so-called restraints growing out of agreements between contractors and labor.

The basing point and zone price systems were dragged in the proceedings by Mr. Arnold when he charged that they have been used by various building materials industries to establish "by formula a rigid structure of uniform prices throughout the country; and in some of these industries such price formulas have encouraged the wasteful location of industrial plants and wasteful shipment of products to great distances."

In his attack on labor, Mr. Arnold said the building trades unions often participate with contractors in policies of restraint and add new restraints of their own.

"In recent years," said Mr. Arnold in referring to building trades unions, "they have frequently been used as the strong-arm squads for collusive agreements among contractors, refusing to supply labor where the contractor's ring wishes labor withheld. In other cases the unions themselves have refused to permit the use of new products or new processes because of their fear that the new method might make it possible to erect a house with fewer hours of labor than the old."

Will Use Anti-trust Law

Mr. Arnold's testimony dealt with functions which he said anti-trust enforcement can perform in solving the problem in the building industry provided enforcement operates on a broad scale in coordination with other Government agencies and with private capital. Referring to a statement by Isador Lubin, Commissioner of Labor Statistics, that 525,000 housing units per year for 10 years are necessary to maintain even the present inadequate level of housing, Mr. Arnold said that there is no chance of getting these units under present conditions. The most effective tools at present available to unreasonable restraints were held to be the most conspicuous reasons for high construction costs and Mr. Arnold declared that the most effective tools at present available to attack these restraints are the anti-trust laws.

The proposed prosecutions, Mr. Arnold told the committee, are the result of complaints against restraints by business men. With its appropriation boosted to $1,300,000 so as to provide a staff of more than 200 lawyers, Mr. Arnold said that for the first time the anti-trust division is in a position for nationwide anti-trust enforcement, as contrasted with previous localized action.

High Spots of Program

Highlights in the Department's prosecution program were outlined by Mr. Arnold as follows:

The objective of anti-trust enforcement should be to establish a free and independent economy in the building industry—not Government controlled nor dominated. Legal procedures should be utilized in a reasonable way to get constructive results. Trust busting should not be considered an end in itself.

To accomplish such an objective an anti-trust program in the building industry requires simultaneous action on a nation-wide scale against all the restraints which affect the price of the final product—the completed house. This is essential so that by attacking one group we shall not handicap them in the total situation. It is also essential in order to show the effect on interstate commerce of the restrictions which might otherwise appear to be local. Finally, it is essential in order to permit development over a broad area of experiments in mass production of housing.

"Such a program should be coordinated if possible with voluntary allocation of funds by state and Federal financing agencies to the localities which are first freed from the paralyzing effects of price-fixing combinations. In this way increasing volume should lead to lower prices instead of higher.

Boycott a Leading Restraint

"Such an enforcement program should be coordinated if possible with the efforts of private organizations interested in cheaper houses, which are now forced to compromise with various aggressive combinations for the privilege of constructing homes."

Mr. Arnold declared that the boycott of standardized materials is one of the principal restraints of trade today in the building industry.

"The stoppage of the flow of competing materials and services in commerce is equally illegal whether it be done by vertical combinations, or by manufacturers, or by contractors, or by labor, or by municipal ordinances and state laws, many of which in reality are not building regulations, but protective tariffs against other parts of the nation," he pointed out.

Detroit Tool and Die Shops Vote a Sympathy Strike

DETROIT—A sympathy strike with General Motors tool and die workers was voted Monday night by 1800 members of Locals 155 and 157 UAW-CIO who were to attempt Wednesday morning to stop all work on General Motors tools and dies in independent job shops in Detroit. According to the UAW, 1500 to 2000 men will be affected but they will not stop work on tools and dies destined for the plants of other automobile companies.

Meanwhile, other automobile companies have exerted every possible pressure to rush their work to completion so construction of new models will not be delayed.

At press time indications were that the General Motor strike is definitely deadlocked with no promise of any kind of break for several days. The corporation has stated publicly that it will not negotiate with any UAW group until the local UAW, holder of a contract with General Motors is decided by the NLRB or the Courts. General Motors has already filed a petition for a NLRB election. This petition, the first filed by any employer since it was announced that NLRB would entertain such petitions, has brought no reply from the board, except the general information that its rules had not yet been amended to act on an employer petition.

This is generally admitted to leave General Motors in a position where it does not know whether its petition was "out of order" or not.

Developments early in the week included additional strikes at Cleveland and the Saginaw steering gear division. The strike is proving effective in halting preparations for new General Motors models. Meanwhile, the union is maintaining a quasi-mysterious attitude about its plans but it is inferring that production employees will strike, too. That wouldn't make a great deal of difference in the last analysis because when 1939 production work is completed further work on 1940 models will be impossible without settlement of the tool and die strike.

For more strike story, see "This Week on the Assembly Line."

Shenango Furnace to Buy Hunter Steel Co. Plant

PITTSBURGH — Subject to the approval of stockholders at a meeting to be held Aug. 15, the Hunter Steel Co., structural fabricators, will sell its Neville Island, Pa., plant to Shenango Furnace Co., one of Pittsburgh's oldest concerns.

The Hunter Steel Co. will lease back from Shenango all that portion of the plant that it requires to continue its structural business. Shenango, on the other hand, will retain a portion of the plant for the manufacture of ingot molds and other products.

This transaction will enable Shenango Furnace Co. to enter the Pittsburgh district as mold manufacturers for the first time, a location which will be enhanced somewhat because of facilities for shipment of molds by river.

Shenango, through a subsidiary company, the Shenango Penn Mold Co., manufactures ingot molds, stools, and heavy castings, with the capacity of approximately 180,000 tons of ingot molds a year. The plants are situated at Sharpsville, Pa., adjoining two blast furnaces of the company which have a combined total annual capacity of 400,000 tons of pig iron.

The sale of Hunter Steel's Neville Island plant, which is located near Pittsburgh and on the Ohio River, to Shenango Furnace Co. is being made at a price slightly in excess of $1,000,000. Initial payment is being made by Shenango delivering iron ore to Hunter. Hunter steel is arranging to have this iron ore converted into pig iron by Pittsburgh Coke & Iron Co. and in turn, the pig iron will be used for the manufacture of ingot molds at the new Shenango mold plant. Hunter will purchase additional iron ore from Shenango subsequent to the initial iron ore supplies which are to take care of the first payment.

This transaction is expected to improve Hunter Steel Co.'s working capital and, it is said, will also improve its competitive position in the structural business. The Pittsburgh Coke & Iron Co. recently acquired 47 per cent of the common stock of the Hunter Steel Co. The Shenango Furnace Co. is the operating company of the W. P. Snyder & Co., Pittsburgh, which celebrated its 50th anniversary recently, having been founded in 1888 by the late William P. Snyder, iron and steel pioneer.

$6,000,000 Soviet Strip Mill to Mesta

THE Soviet Government has tentatively awarded a contract for a $6,000,000 continuous strip mill to Mesta Machine Co., Pittsburgh, in the largest order to be placed in the United States by that government in several years.

Mesta Machine declined to confirm the placing of the contract which, according to the Amtorg Trading Corp., will go to the Pittsburgh company.

Australia Depends Less on Imports

WASHINGTON—Due chiefly to its policy of encouraging manufacturing for national defense purposes, domestic production in Australia has been replacing imported products at the rate of approximately $38,955,000 annually in recent years, according to a report to the Department of Commerce from the office of the American trade commissioner at Sydney. Among products estimated as being capable of local manufacture and the facilities for their output are machinery and other heavy industry products, $23,373,000; tinplate, $9,349,000 and motor cars, $27,268,000.

Merger of Scottish Steel Companies Completed

LONDON — Final agreement has been reached for the amalgamation of the blast furnace, coke oven, and collier interests of William Board & Co., Ltd., Glasgow, with the Scottish Iron & Steel Co., Ltd. The capital of Scottish Iron & Steel will be increased by £1,950,000 ($9,750,000), the total nominal amount of the preference and ordinary stock of William Bairds & Scottish Steel, Ltd.

Pennsylvania Steel Scrap Company Organized

THE Pennsylvania Steel Scrap Co. has been organized with Harry A. Kirchmann, Philadelphia as president. The company will operate yards at Conshohocken and Phoenixville, Pa., equipped with modern equipment for handling and preparation of all grades of iron and steel scrap.

REINFORCING STEEL

. . . Awards of 6575 tons; 14,955 tons in new projects.

ATLANTIC STATES AWARDS

980 Tons, Quincy, Mass., Procter & Gamble Mfg. Co. plant, to Truscon Steel Co., Boston; previously reported 775 tons.

CENTRAL AND WESTERN STATES

3000 Tons, Chicago, subway section, to Ceco Steel Products Co., Chicago, through Paschen Brothers Construction Co., Chicago.

1575 Tons, Ceredo-Kenova, W. Va., Huntington flood wall for U. S. Engineers, to West Virginia Rail Co., Huntington, W. Va.

300 Tons, Decatur, Ill., Archer-Daniels elevator, to Laclede Steel Co., St. Louis.

242 Tons, San Francisco, Junior College gymnasium, to Ceco Steel Products Co., San Francisco, through Azevedo Construction Co., San Francisco.

230 Tons, Saginaw, Mich., combination grade separation and bridge over Saginaw River and Michigan Central Railroad track at Court Street, to Bethlehem Steel Co., Bethlehem, Pa.

200 Tons, Chicago, Chicago Rival Packing Co. building, to Inland Steel Co., Chicago.

200 Tons, Minneapolis, Atchison Elevator Co. building, to Laclede Steel Co., St. Louis.

155 Tons, Talmadge, Cal., ward F, Mendocino State Hospital, to Bethlehem Steel Co., San Francisco, through Azevedo Construction Co., San Francisco.

150 Tons, Monroe, Mich., port improvements, contract No. 2, to Great Lakes Steel Corp., Detroit.

110 Tons, San Francisco, joint highway district No. 10 list, to Truscon Steel Co., San Francisco.

100 Tons, San Francisco, Federated Metals Division, American Smelting & Refining Co. plant, to Soule Steel Co., San Francisco.

100 Tons, Whiteside County, Ill., bridge to Calumet Steel Co., Chicago.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

3000 Tons, New Ellenville, N. Y., contract No. 340, Lackawack Dam, Delaware Aqueduct; bids July 25.

1600 Tons, Hornell, N. Y., channel improvement project for U. S. Army; bids due July 10.

350 Tons, Oneida County, N. Y., mostly mesh, highway project R.C. 4041, Davis & Stearns, Inc., Whitesboro, N. Y., low bidder (previously reported).

250 Tons, Monroe and Ontario Counties, New York, mostly mesh, highway project R.C. 4018, Warren Bros. Roads Co., Cambridge, Mass., low bidder (previously reported).

186 Tons, Herkimer County, N. Y., mostly mesh, highway project R.C. 4040, Dale Engineering Co., Utica, N. Y., low bidder (previously reported).

185 Tons, Erie County, N. Y., mostly mesh, highway project R.C. 4037, Depew Paving Co., Inc., Depew, N. Y., low bidder (previously reported).

132 Tons, Steuben County, N. Y., including 25 tons structural steel, highway project R.C. 4043, Hornell Construction Corp., Hornell, N. Y., low bidder (previously reported).

CENTRAL AND WESTERN STATES

2850 Tons, Enumclaw, Wash., Mud Mountain Dam; bids August 8.

2500 Tons, Chicago, Ida B. Wells housing project for Negroes; bids July 25.

1800 Tons, Niland, Cal., All-American Canal Project (Invitation B-42291-A); bids in.

800 Tons, Chicago, armory, bids in.

600 Tons, Chicago, Commonwealth Edison Co., Fiske Street building; bids in.

500 Tons, Chicago, Rosenbaum Elevator Co. building.

255 Tons, Piru, Cal., bridge; bids July 27.

250 Tons, Chicago, underpass, Damen and 75th Streets.

250 Tons, Owensboro, Ky., bridge.

250 Tons, Washington, Freedman's Hospital.

200 Tons, Bieber, Cal., bridge; bids July 26.

100 Tons, Caldwell, Idaho, Bureau of Reclamation (Invitation 21142-A); bids in.

. . . PIPE LINES . . .

Gulf Natural Gas Corp., Shreveport, La., has closed contract with city council, Houma, La., for steel pipe line system for natural gas distribution, including welded steel pipe line for connection with company system for gas supply, control station and other operating facilities. Cost about $250,000. Municipality recently approved bond issue in that amount.

Union Oil Co. of California, Union Oil Building, Los Angeles, has approved plans for extensions in main 10-in. welded steel pipe line in Santa Maria Valley oil field, near Santa Maria, Cal., totaling about 11,500 ft., for crude oil transmission from west end of field.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 25 for steel pipe and steel tubing for Portsmouth, N. H., and Mare Island, Cal., Navy yards (Schedule 6741).

Standard Oil Co. of Indiana, Inc., 910 South Michigan Avenue, Chicago, plans new 8-in. welded steel pipe line from oil refinery at Sugar Creek, Mo., to point near Council Bluffs, Iowa, about 180 miles, for gasoline transmission. Pumping stations will be installed at points along route for booster service. Cost about $1,500,000 with operating facilities.

Peoples' Natural Gas Co., Aquila Court Building, Omaha, Neb., plans steel pipe lines for natural gas distribution at Paullina, Iowa, including welded steel pipe line for connection with main system for supply. A proposal made by company has been approved by municipality.

Central New York Power Corp., Watertown, N. Y., plans pipe lines in parts of St. Lawrence, Jefferson, Lewis and Franklin counties for extensions in gas transmission system. Work will be carried out by company forces and will form part of expansion and improvement program for gas and electric utilities in company territory to cost over $1,000,000. R. W. Porter is vice-president in charge.

Empire Gas & Fuel Co., Wellsville, N. Y., has approved plans for pipe line extensions in system for natural gas transmission. Work will be carried out by company forces. Cost close to $40,000.

NLRB Rules for CIO Against Essex Wire

WASHINGTON—The National Labor Relations Board has issued a proposed order directing the Essex Wire Corp., of Highland Park, Mich., to bargain upon request with the CIO's United Electrical, Radio and Machine Workers of America. The board's announcement said that the company had previously entered into an agreement with the union but that a letter directed to the company by the union last April had been interpreted by the firm as canceling the contract.

The board also has announced the appointment of Oscar S. Smith as its regional director at Cleveland. A former field examiner at the NLRB Chicago office, Mr. Smith succeeds James P. Miller, who resigned several months ago. During the interim, Harry L. Lodish has been acting regional director for the Cleveland area.

CAST IRON PIPE

Dobson, N. C., plans pipe lines for water system and other waterworks installation. Cost about $100,000, of which approximately $40,000 will represent a bond issue and remainder secured through Federal aid.

Winnsboro, Tex., plans pipe line extensions in water system and other waterworks installation; also improvements in sewer system. Albert C. Moore & Co., Smith-Young Tower Building, San Antonio, Tex., are consulting engineers.

Shafter Public Utility District, Shafter, Cal., plans pipe line extensions in water system. Fund of about $45,000 will be arranged for this and other waterworks installation. C. L. Black is engineer.

Water Department, Council Bluffs, Iowa, Frank Jensen, superintendent, plans about 3000 ft. of 6-in. pipe for extensions in water system.

Ohio Cities Water Co., Tiffin, Ohio, plans 10 and 8-in. pipe, latter to replace a number of 6-in. lines. Cost about $40,000. C. H. Wetter is superintendent in charge.

Ashland, Ohio, plans pipe line extensions and replacements in water system; also installation of water-softening plant, pumping units and other waterworks equipment. Cost about $70,000. E. D. Barstow, 615 Broad place, Akron, Ohio, is consulting engineer.

Water Department, City-County Building, Pittsburgh, has let contract to Henry Butch, 2 Emma Street, for pipe lines for water system in Southside district, at $62,833.80.

Borough Council, Fox Chapel, Pa., plans early call for bids for pipe line extensions in water system in Bellefield district; also for other waterworks installation. Chester Engineers, Inc., 210 East Parkway, N. S., Pittsburgh, is consulting engineer.

Port Austin, Mich., plans pipe lines for water system and other waterworks installation. Estimates of cost are being made.

Wichita, Kan., will take bids soon for about 25 miles of various sized pipe for extensions and replacements in water system, in conjunction with development of new wells for increased supply; also pipe lines for collecting system, storage reservoir, filter station with capacity of 25,000,000-gal. per day, pumping plant and other waterworks installation. Cost about $2,245,000. Black & Veatch, 4706 Broadway, Kansas City, Mo., are consulting engineers.

Orrville, Ohio, will ask bids soon for about 2750 ft. of 8-in., 2320 ft. of 6-in., and 1315 ft. of 4-in. pipe for extensions in water system. Hoover & Montgomery, 8 East Long Street, Columbus, Ohio, are consulting engineers.

Department of Public Works, City Hall, Montreal, Que., J. E. Blanchard, director, plans pipe line extensions and replacements in entire water system, recently acquired from Montreal Water & Power Co. Cost about $1,000,000.

British Speed Up Air-Raid Shelter Output

LONDON—As a result of arrangements with the British steel industry, including the utilization of fresh overseas sources of raw materials, there is to be a further and considerable speed-up in the production of steel air-raid shelters in the United Kingdom. Apart from these arrangements, orders for a further 1,000,000 steel shelters are to be placed immediately, making a total of 2,500,000 delivered or on order. Authority has also been given for the ordering of a further 100,000 sets of basement strutting material, making a total of 200,000.

June Pig Iron Output Up 27½%

PRODUCTION of coke pig iron in June totaled 2,118,451 gross tons, compared with 1,717,516 tons in May. The daily rate in June showed a gain of 27.5 per cent over that in May, or from 55,404 tons a day in May to 70,615 tons in June. The rate of operation last month was at 51.7 per cent of the industry's capacity, as compared with 40.8 per cent in May.

Production for the first six months this year totaled 12,522,369 gross tons as compared with 7,873,026 tons for the corresponding period last year. On a daily basis production averaged 69,184 tons, a gain of 59.1 per cent over the 43,497 tons daily in the same period last year.

There were 118 furnaces in blast on July 1, operating at the rate of 72,495 tons a day, compared with 107 furnaces on June 1, producing at the rate of 60,515 tons daily. Thirteen furnaces were put in operation and two were blown out or banked. The United States Steel Corp. put four in operation. Independent producers put nine in operation and took one off blast and merchant producers blew out or banked one furnace.

Furnaces blown in included: One Ohio, one South Chicago (new), and one Gary, Carnegie-Illinois Steel Corp.; one Ensley, Tennessee, Coal, Iron & Railroad Co.; one Donner, one Haselton, one United, and one Pioneer, Republic Steel Corp.; one Sparrows Point, Bethlehem Steel Corp.; one Ashland, American Rolling Mill Co.; one Campbell, Youngstown Sheet & Tube Co.; and one LaBelle and one Riverside, Wheeling Steel Corp.

Furnaces blown out or banked were the Federal furnace of Interlake Iron Corp. and one Colorado Fuel & Iron Co. furnace.

Production of Coke Pig Iron and Ferromanganese

Gross Tons

	Pig Iron*		Ferromanganese†	
	1939	1938	1939	1938
January	2,175,423	1,429,085	20,805	22,388
February	2,060,187	1,298,268	18,655	20,205
March	2,394,615	1,452,487	16,008	21,194
April	2,056,177	1,376,141	11,518	18,607
May	1,717,516	1,255,024	7,888	13,341
June	2,118,451	1,062,021	16,617	14,546
½ year	12,522,369	7,873,026	91,491	110,281
July	.....	1,201,785	....	20,818
August	.....	1,493,995	....	6,088
September	.....	1,680,435	....	630
October	.....	2,052,284	....	3,621
November	.....	2,269,983	....	13,156
December	.....	2,210,728	....	19,197
Year	.....	18,782,236	....	173,791

*These totals do not include charcoal pig iron.
†Included in pig iron figures.

Merchant Iron Made, Daily Rate

Tons

	1939	1938	1937	1936	1935
January	10,603	10,635	16,106	10,537	3,926
February	9,637	8,854	16,514	11,296	6,288
March	8,951	8,524	16,457	10,831	7,089
April	8,508	8,273	14,517	13,897	8,799
May	7,038	6,431	19,483	12,814	8,441
June	7,613	5,375	15,870	14,209	7,874
July	....	5,495	19,609	11,619	8,644
August	....	6,614	17,831	12,148	8,194
September	....	11,205	20,065	12,526	10,090
October	....	10,799	18,950	13,645	11,199
November	....	13,208	15,662	14,739	12,503
December	....	9,130	10,964	14,852	13,312

Daily Average Production of Coke Pig Iron

Gross Tons

	1939	1938	1937	1936	1935
January	70,175	46,100	103,597	65,351	47,656
February	73,578	46,367	107,115	62,886	57,448
March	77,246	46,854	111,596	65,816	57,098
April	68,539	45,871	113,055	80,125	55,449
May	55,404	40,485	114,104	85,432	55,713
June	70,615	35,400	103,584	86,208	51,570
½ year	69,184	43,497	108,876	74,331	54,138
July	....	38,767	112,866	83,686	49,041
August	....	48,193	116,317	87,475	56,816
September	....	56,015	113,679	91,010	59,216
October	....	66,203	93,311	96,512	63,820
November	....	75,666	66,891	98,246	68,864
December	....	71,314	48,075	100,485	67,950
Year	....	51,458	100,305	83,658	67,556

Production by Districts and Coke Furnaces in Blast

FURNACES	Production (Gross Tons) June (30 Days)	Production (Gross Tons) May (31 Days)	July 1 Number in Blast	July 1 Operating Rate, Tons a Day	June 1 Number in Blast	June 1 Operating Rate, Tons a Day
New York:						
Buffalo	142,406	124,196	8	4,850	7	4,005
Other New York and Mass.	10,950	.....	1	365	1	545
Pennsylvania:						
Lehigh Valley	47,332	49,692	4	1,580	4	1,605
Spiegeleisen	4,176	4,457	1	140	1	145
Schuylkill Valley	18,284	19,241	2	610	2	620
Susquehanna and Lebanon Valleys	14,490	14,870	1	485	1	480
Pittsburgh District	406,019	309,378	20	13,535	20	10,420
Ferro. and Spiegel	5,401	2,989	1	180	1	95
Shenango Valley	.....	.....	0	....	0	....
Western Pennsylvania	52,758	47,295	3	1,760	3	1,945
Ferro. and Spiegel	6,417	2,100	1	215	1	70
Maryland	151,654	123,843	6	5,450	5	4,590
Wheeling District	107,400	72,975	6	4,030	4	2,355
Ohio:						
Mahoning Valley	226,785	154,847	11	8,240	8	5,385
Central and Northern	169,986	126,146	9	5,840	8	4,325
Southern	46,123	47,041	5	1,535	5	1,515
Illinois and Indiana	395,435	325,542	16	12,975	15	11,795
Michigan and Minnesota	74,900	72,515	4	2,495	4	2,340
Colorado, Missouri and Utah	37,765	45,837	2	1,005	3	1,480
The South:						
Virginia	.....	.....	0	....	0	....
Ferromanganese	2,799	2,799	1	95	1	90
Kentucky	14,732	14,420	2	680	1	465
Alabama	175,935	157,333	13	6,205	12	6,245
Ferromanganese and spiegel	6,704	.....	1	225	0	....
Tennessee	.....	.....	0	....	0	....
Total	2,118,451	1,717,516	118	72,495	107	60,515

Industrial Building Costs Under 25-year Average

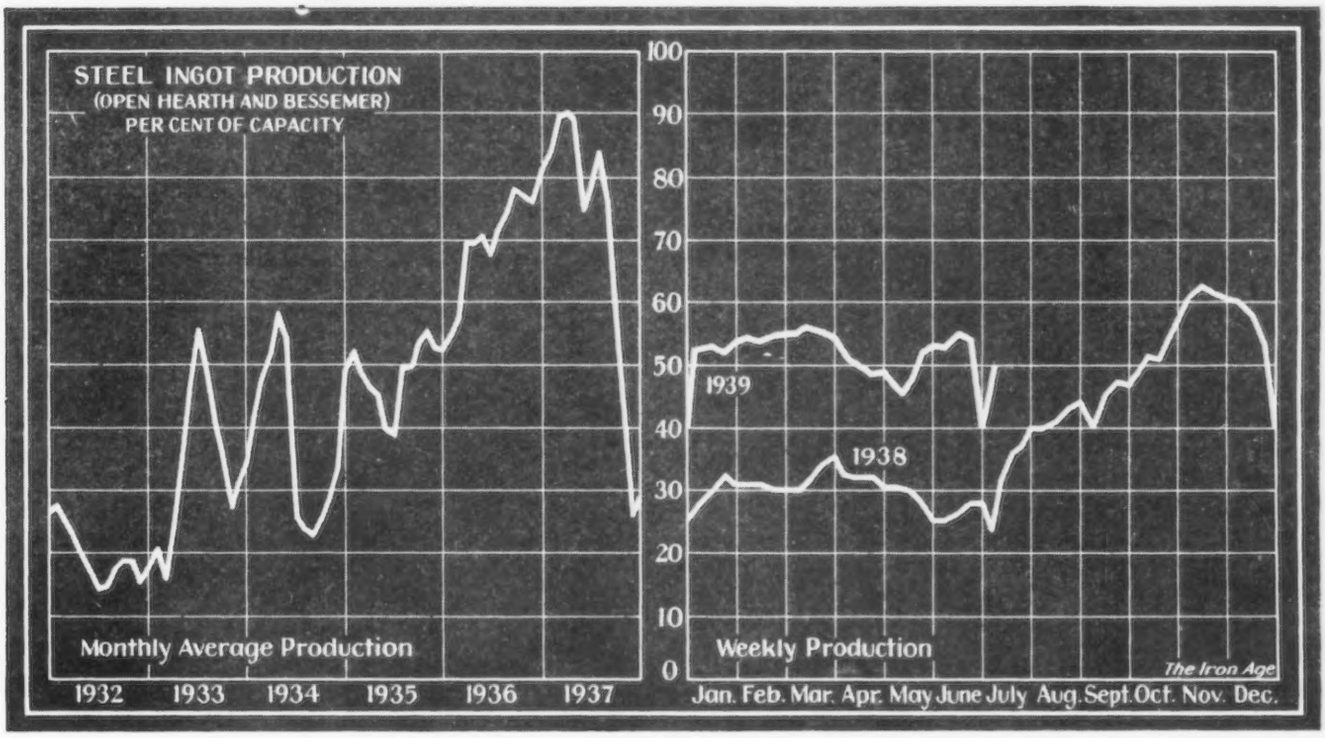
CLEVELAND — Industrial building costs in the first half of 1939 were 8 per cent below the 25-yr. average for such work, according to a cost chart maintained by the Austin Co., engineer and builder. The chart records the average cost per square foot of one-story daylight plant construction by quarters starting with January, 1913.

The current cost is $1.40 per sq. ft. as compared to a 25-yr. average of $1.52. It compares with a record high of $2.67 in the spring of 1921 and a depression low of $1.08 during the first half of 1933. These costs do not include heating, lighting and plumbing.

Gadsden Pipe Plant, Idle Since 1931, to Open

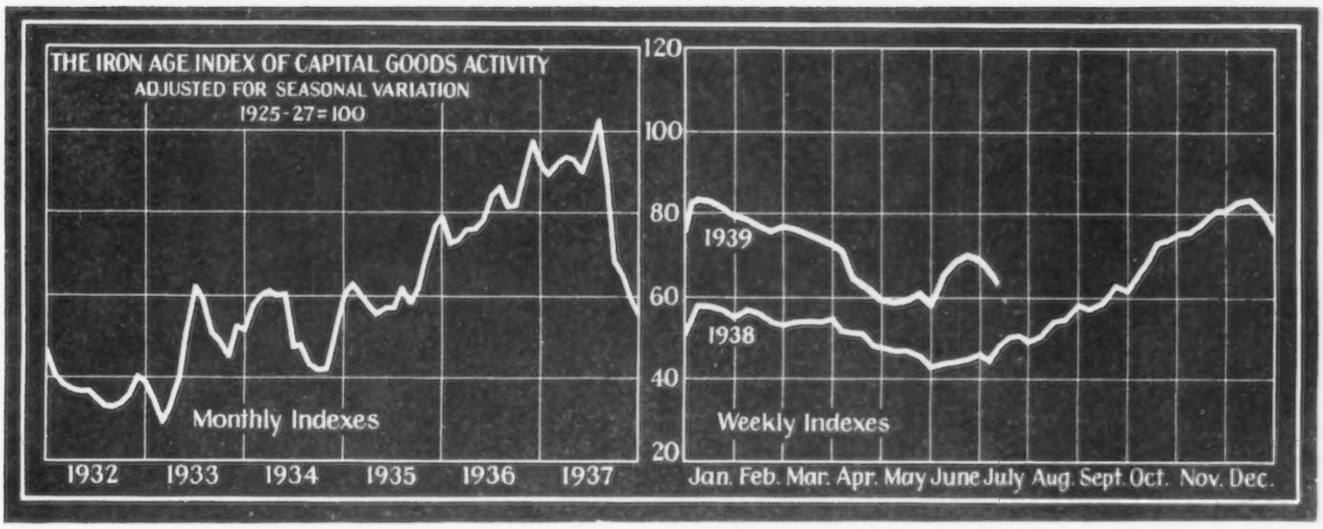
BIRMINGHAM—Wetter Pipe Co., Gadsden, Ala., closed since 1931, is scheduled to reopen about Aug. 1. The plant has been leased to the Gadsden Iron Co., organized by Chicago interests headed by W. D. Neal.

Ingot Production Recovers to 50%



District Ingot Production, Per Cent of Capacity	Pitts-burgh	Chicago	Valleys	Phila-delphia	Cleve-land	Buffalo	Wheel-ing	Detroit	Southern	S. Ohio River	Western	St. Louis	East-ern	Aggre-gate
CURRENT WEEK..	45.0	50.0	52.0	38.0	24.0	36.5	77.0	62.0	75.0	34.0	57.0	49.5	30.0	**50.0**
PREVIOUS WEEK..	34.0	44.5	34.0	32.0	26.0	28.0	58.0	40.0	60.0	38.0	35.0	35.0	28.0	**40.0**

Holiday Shutdown Causes Sharp Break in Index



THE curtailment of operations in the capital goods industry in the holiday week was particularly severe, according to THE IRON AGE index, which dropped 6.6 points to 61.9 for the week ended July 8. This decline completely eradicated the gains of the past five weeks and compares with a decrease of 1.3 points in the July 4th week in 1938. In 1937 the holiday fell on a Sunday. The losses, after adjustment, ranging from 20 points in the steel series to 1.8 points in the heavy construction factor. Undoubtedly seasonal, as well as holiday influences, were instrumental in the decrease in automobile output. The two components which rose during the week, Pittsburgh and lumber carloadings, lag one week behind the others, and consequently will not show the effect of the holiday until next week.

	Week Ended July 8	Week Ended July 1	Comparable Week 1938	Comparable Week 1929
Steel ingot production[1]	61.0	81.0	33.5	137.1
Automobile production[2]	48.7	65.6	29.3	108.5
Construction contracts[3]	70.3	72.1	62.2	120.4
Forest products carloadings[4]	60.6	55.3	51.7	117.6
Production and shipments, Pittsburgh District[5]	69.1	68.7	46.4	127.9
Combined index	**61.9**	**68.5**	**44.6**	**122.3**

Sources: 1. THE IRON AGE; 2. Ward's Automotive Reports; 3. *Engineering News-Record;* 4. Association of American Railroads; 5. University of Pittsburgh.

. . . SUMMARY OF THE WEEK . . .

. . . Ingot production recovers to 50 per cent; further gain seen.

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. . . Scrap strong, with advances at Pittsburgh and Cleveland.

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. . . First half steel output up 73 per cent, pig iron about 60 per cent.

WHILE steel production has not yet regained all of its losses of the holiday week, it has snapped back to a 50 per cent rate for the industry, with indications that additional units will be active again late this week or early next week.

This rise in operations is occurring despite the strike of tool and die makers at General Motors plants, which has crippled work on 1940 models and has held up some steel releases.

In several steel-producing districts, notably Detroit, eastern Pennsylvania, Buffalo, Birmingham and the West, operations are higher than they were in the pre-holiday week, while in the Youngstown and Wheeling-Weirton districts the same rate has been attained as before the holiday. The Pittsburgh and Chicago districts are only one point below their pre-holiday rate.

In the Birmingham district, 17 open hearth furnaces are in operation against 14 the early part of last week. The Tennessee Coal, Iron & Railroad Co. has put on another blast furnace, which places all of its furnaces in operation, and its Ensley rail mill is resuming this week. There has been a sharp rise at Detroit, where one plant has added two open hearths.

Were it not for the shutting down of the open-hearth department of the Middletown plant of the American Rolling Mill Co. while a new blooming mill is being installed and a temporary shutdown of a plant in the Cleveland district, this week's rate for the industry would have been more than two points higher.

COINCIDING with the improvement in steel operations, scrap markets have turned stronger. Sizable purchases by two companies in the Cleveland district have raised quotations there 50c. a ton, while a 25c. rise has occurred at Pittsburgh. The Chicago market for No. 1 steel scrap is still quotable at $13.25 to $13.50, but brokers are finding it difficult to buy at less than $13.50, while the $15.50 quotation at Philadelphia is in strong position and points higher because of continued good export shipments and an improving domestic demand. THE IRON AGE scrap composite price has gained 8c. to $14.79, recovering the ground lost since the second week of June and being only 50c. below its peak for the year.

IN the first half of this year steel ingot production gained 73 per cent over the corresponding period last year, while pig iron output was almost 60 per cent higher. The total for ingot production was 18,629,927 gross tons against 10,788,583 tons in the same period last year, an average rate this year of 52.74 per cent compared with 31.08 per cent in the first half of last year. June production was 3,130,381 tons compared with 2,917,876 tons in May.

Pig iron production for the six months was 12,522,369 gross tons against 7,873,026 tons in the first half of 1938. June output was 2,118,451 tons compared with 1,717,516 tons in May, the daily rate last month having been 70,615 tons, or a gain of 27½ per cent over the May daily rate of 55,404 tons. On July 1 there were 118 furnaces in blast, a gain of 11 over the number in operation on June 1.

NEW orders for steel products so far this month are not holding at the volume of late June, when there was considerable coverage at price concessions, but the volume is better than some of the steel companies had expected. The farm implement industry, which is embarking on new production schedules, is hopeful of good buying; shipbuilding on the Atlantic seaboard is now the most active since the World War; the steel construction industry sees a good deal of work still ahead of it, though awards are temporarily slack, and the automobile industry, while discouraged by the strike situation, derives satisfaction from its first-half record of passenger car sales totaling 2,045,670, a 57 per cent gain over the first half of 1938, while June sales were 70 per cent above those of the same month last year.

On the other side of the picture, railroad buying prospects are no better, though hope still exists, and tin plate production is slowly tapering off, but will remain fairly good probably until September at least. Structural steel awards were only 8000 tons in the week. A Chester, Pa., shipyard will require 16,000 tons of plates and shapes for two boats to be built for Seatrain Lines, Inc.

Steel prices are undergoing a period of test, the results of which will not be fully apparent for some weeks.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	July 11, 1939	July 3, 1939	June 13, 1939	July 12, *1938
Rails, heavy, at mill	$40.00	$40.00	$40.00	$42.50
Light rails: Pittsburgh, Chicago, Birmingham	40.00	40.00	40.00	43.00
Rerolling billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point.	34.00	34.00	34.00	34.00
Sheet bars: Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point	34.00	34.00	34.00	34.00
Slabs: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	34.00
Forging billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham	40.00	40.00	40.00	40.00
Wire rods: Nos. 4 and 5, Pittsburgh, Chicago, Cleveland	43.00	43.00	43.00	43.00
Skelp, grvd. steel: Pittsburgh, Chicago, Youngstown, Coatesville, Sparrows Point, cents per lb.	1.90	1.90	1.90	1.90

Finished Steel

Cents Per Lb.:				
Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.15	2.15	2.15	2.25
Plates: Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont	**2.10	2.10	2.10	2.10
Structural shapes: Pittsburgh, Chicago, Gary, Buffalo, Bethlehem, Birmingham	2.10	2.10	2.10	2.10
Cold finished bars: Pittsburgh, Buffalo, Cleveland, Chicago, Gary	2.65	2.65	2.65	2.70
Alloy bars: Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton	2.70	2.70	2.70	2.80
Hot rolled strip: Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown, Birmingham	2.00	2.00	2.00	2.15
Cold rolled strip: Pittsburgh, Cleveland, Youngstown	2.80	2.80	2.80	2.95
Sheets, galv., No. 24: Pittsburgh, Gary, Sparrows Point, Buffalo, Middletown, Youngstown, Birmingham.	3.50	3.50	3.50	3.50
Hot rolled sheets: Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown	2.00	2.00	2.00	....
Cold rolled sheets: Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown	3.05	3.05	3.05	....

**Subject to concessions in some districts.

Cents Per Lb.:	July 11, 1939	July 3, 1939	June 13, 1939	July 12, *1938
Wire nails: Pittsburgh, Chicago, Cleveland, Birmingham	2.40	2.45	2.45	2.45
Plain wire: Pittsburgh, Chicago, Cleveland, Birmingham	2.60	2.60	2.60	2.60
Barbed wire, galv.: Pittsburgh, Chicago, Cleveland, Birmingham	3.25	3.30	3.30	3.20
Tin plate, 100 lb. base box: Pittsburgh and Gary	$5.00	$5.00	$5.00	‡$5.35

*Pittsburgh prices only.
†Applies to 80-rod spools only.
‡Subject to post-season adjustment.

Pig Iron

Per Gross Ton:				
No. 2 fdy., Philadelphia	$22.84	$22.84	$22.84	$21.84
No. 2, Valley furnace	21.00	21.00	21.00	20.00
No. 2, Southern Cin'ti	21.06	21.06	21.06	20.06
No. 2, Birmingham	17.38	17.38	17.38	16.00
No. 2, foundry, Chicago†	21.00	21.00	21.00	20.00
Basic, del'd eastern Pa.	22.34	22.34	22.34	21.34
Basic, Valley furnace	20.50	20.50	20.50	19.50
Malleable, Chicago†	21.00	21.00	21.00	20.00
Malleable, Valley	21.00	21.00	21.00	20.00
L. S. charcoal, Chicago	28.34	28.34	28.34	28.34
Ferromanganese, seab'd carlots	80.00	80.00	80.00	92.50

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh.	**$15.50**	$15.25	$15.25	$14.25
Heavy melting steel, Phila.	15.50	15.50	15.50	13.25
Heavy melting steel, Ch'go.	13.375	13.375	13.625	11.75
Carwheels, Chicago	12.75	12.75	12.75	13.00
Carwheels, Philadelphia	16.00	16.00	16.00	14.75
No. 1 cast, Pittsburgh	15.25	15.25	15.25	14.75
No. 1 cast, Philadelphia	16.25	16.25	16.25	15.75
No. 1 cast, Ch'go, (net ton)	12.25	12.25	12.25	11.75

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$3.75	$3.75	$3.75	$3.75
Foundry coke, prompt	4.75	4.75	4.75	4.75

Non-Ferrous Metals

Cents per Lb. to Large Buyers:				
Copper, electrolytic, Conn.	**10.25**	10.00	10.00	9.75
Copper, lake, New York	**10.25**	10.00	10.00	9.875
Tin (Straits), New York	*48.50*	48.80	48.25	42.875
Zinc, East St. Louis	4.50	4.50	4.50	4.75
Zinc, New York	4.89	4.89	4.89	5.14
Lead, St. Louis	4.70	4.70	4.60	4.75
Lead, New York	4.85	4.85	4.75	4.90
Antimony (Asiatic), N. Y.	14.00	14.00	14.00	14.00

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
July 11, 1939	2.236c. a Lb.	$20.61 a Gross Ton	$14.79 a Gross Ton
One week ago	2.236	20.61	14.71
One month ago	2.236	20.61	14.79
One year ago	2.300	19.61	13.08
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.	Based on average for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel: High	Finished Steel: Low	Pig Iron: High	Pig Iron: Low	Steel Scrap: High	Steel Scrap: Low
1939	2.286c., Jan. 3	2.236c., May 16	.....	.....	$15.29, Mar. 28	$14.08, May 16
1938	2.512c., May 17	2.211c., Oct. 18	$23.25, June 21	$19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.512c., Mar. 9	2.249c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 10
1936	2.249c., Dec. 28	2.016c., Mar. 10	19.73, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.062c., Oct. 1	2.056c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 23
1934	2.118c., Apr. 24	1.945c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.953c., Oct. 3	1.792c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.915c., Sept. 6	1.870c., Mar. 15	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.981c., Jan. 13	1.883c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.192c., Jan. 7	1.962c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.223c., Apr. 2	2.192c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.192c., Dec. 11	2.142c., July 10	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 9

. . . THIS WEEK'S MARKET NEWS . . .

PRICES

. . . Testing period now going on in steel quotations

STEEL prices are now undergoing a period of test, the full results of which may not be known for a few weeks because many buyers covered their requirements for at least 30 days in late June, when notice was given by some mills of the withdrawal of concessions from published levels.

Efforts are being directed also toward the elimination of abuses which have affected the net revenues of the mills. Prominent among these abuses is the duplication of tonnages on which fabrication-in-transit rates apply.

Plate prices have been exceptionally weak, but some mills are said to have reverted to a quotation of 2.10c. per lb., basing point. Concessions had amounted to as much as $4 a ton.

Bar mills appear to be holding firmly to the new price of 2.15c. a lb., basing point.

Prices of merchant wire products are steadier.

NEW BUSINESS

. . . Orders this month generally better than expected

To some extent, steel business in the PITTSBURGH district in the past week was still influenced by holiday and inventory factors and producers look to next week to obtain a clearer picture of the immediate outlook. Some shipments of sheets and strip, originally scheduled this week for automotive companies, have been held up because of union jurisdictional disputes. Miscellaneous business, although not quite as active as during the closing weeks in June, is holding up exceptionally well in view of this time of the year when summer lull effects are usually felt.

New business this month has been spotty for steel producers at CLEVELAND and YOUNGSTOWN but order accumulations are above expectations. In view of the season, the inactivity of the auto industry, and the fact that many steel consumers ordered rather freely last month, very little business had been expected during the early part of July. However, two major fields remain active, the construction and canning industries, and consumer goods are moving well in certain agricultural areas. Government orders are helping to sustain the activity of numerous plants. Manufacturers of electric motors are active, along with the machine tool industry and aircraft suppliers. Pig iron producers note an upturn in releases from the radiation industry, which is entering its peak period, and from agricultural implement makers who had been shut down since late June.

Makers of agricultural machinery are optimistic again after a few months of slack operations in all plants except those making tractors. Dealer stocks throughout the country are low, especially in farm implements, and good crops and a rise in farmers' cash income are forecast. Farm equipment manufacturers say that any increase in buying will be immediately reflected in operations.

Demand from a widely diversified list of industries extending through the entire range of steel products features the Chicago market. No single consumer at the moment can be regarded as of chief importance in the current 50 per cent operating rate. Releases against sheet and strip commitments have not increased appreciably in the past few weeks, though a sharp pickup is looked for from the end of July through August and September because of production on 1940 automobiles.

The CHICAGO construction picture is promising. Demand for reinforcing bars is particularly good.

The holidays have considerably reduced the volume of incoming business in PHILADELPHIA, but sellers find cause for optimism in the manner in which consumers' plant operations have rebounded to pre-holiday levels. Some additional ship tonnage was released in the past week and the future for heavy steel sales still looks very bright. Automobile part makers have placed several small orders, including one for merchant bars, but no real production tonnages have been specified as yet.

Sales of steel products by NEW YORK offices have been spotty since the first of the month, but are averaging better than had been expected. Some offices in the past week noted a decided improvement over the holiday week.

STEEL OPERATIONS

. . . Ingot production snaps back to 50% after holiday week lull

STEEL ingot production for the entire industry has recovered this week most of the loss of the holiday week, being estimated at 50 per cent against 40 per cent last week.

Most of the major districts are operating approximately as well as they were in the pre-holiday week, but the general average is brought down somewhat by the shutting down of the open-hearth department of the American Rolling Mill Co. at Middletown for the entire month while a new blooming mill is being installed. This brings the rate for the SOUTHERN OHIO district down to 34 per cent this week as against 60½ per cent in the pre-holiday week.

Operations in PITTSBURGH were up 11 points to 45 per cent which is within one point of the pre-holiday week rate. The Wheeling-Weirton district is up 19 points to 77 per cent, having regained all of the loss occasioned by the holiday.

The CHICAGO rate has gained five points over last week to 50 per cent, and a further increase is expected next week when the rail mill of one large producer starts up again on a fairly heavy schedule. In the YOUNGSTOWN area operations have gained 18 points over last week to 52 per cent and are even with the rate prior to the holiday. The CLEVELAND-LORAIN rate is down two points this week to 24 per cent owing to a temporary sharp reduction at one plant.

In DETROIT the rate has increased to 62 per cent, the Great Lakes Steel Corp. having put on two more open hearths. A further increase in the DETROIT rate is foreseen over the coming month owing to expected releases from the automobile companies for 1940 model production.

In EASTERN PENNSYLVANIA operations are slightly above the pre-holiday rate. In the BIRMINGHAM district 16 open hearths are in operation, two more than were operated early last week. The Ensley rail mill resumed operations this week for a short run.

PIG IRON

. . . Business dull . . . June shipments generally fell off

PIG iron sales and production at PITTSBURGH have regained about the same pace as existed previous to the holidays. No important change is looked for in the near future.

July started off weak at CLEVELAND but producers are hopeful that total shipments will hold at least to the level of June, which fell below any month since last September. The automotive industry is inactive, but radiation foundries are heading into their peak months and some agricultural implement firms have ordered after several weeks' idleness.

Shipments of foundry coke and pig iron in the CHICAGO territory during June were considerably behind the previous month. Not much of an increase, if any, is looked for this month, although the 1940 model season of the automobile industry and work on fall tools by the farm equipment plants will result in an improvement by August. For the first six months of 1939 foundry coke shipments were about 40 per cent ahead of 1938 while pig iron shipments increased over 60 per cent. Agricultural machinery makers are said to be quite encouraged over fall prospects because of low dealer stocks and good crops. For this reason pig iron producers are anticipating considerable demand from this industry.

The past week saw a slight pickup in shipments of pig iron to melters in the ST. LOUIS area, but there is no buying except a car here and there. Melters have considerable tonnages for which they committed themselves during the first quarter of the year.

Third quarter contracting for pig iron is very quiet in the SOUTHERN OHIO area, melters feeling no need for speculating on commitments.

There has been a slight pickup in the BIRMINGHAM district since July 4.

With many plants shut down for the entire holiday week, there was very little activity in either the NEW YORK or PHILADELPHIA markets in the past week. A few small carlots were placed, but consumers are still shy of third quarter commitments. Foundry operations in the Philadelphia district continue to show a gradual improvement and July shipments are expected to show a substantial gain over June.

Sales at BOSTON the past week totaled about 1100 tons, of which the Mystic Iron Works took better than 500 tons.

SEMI-FINISHED STEEL

. . . Wire rod sales are slightly heavier

SEMI-FINISHED steel activity at PITTSBURGH is substantially unchanged from the pace which existed during the closing weeks of June. Wire rod sales are slightly heavier, suggesting a pickup at bolt and nut plants. Releases on billets and sheet bars from non-integrated sheet and strip mills are being dictated by the incoming volume of flat rolled specifications.

MERCHANT BARS

. . . New business light but shipments are fairly good

WHILE the influence of holiday shutdowns has not completely disappeared, hot rolled bar specifications at PITTSBURGH during the past few days compare favorably with the releases of a month ago. Shipments are expected to be heavier this month than in June because of the July 31 deadline on bars taken at the old price setup.

Production at CLEVELAND and YOUNGSTOWN continues good and shipments are heavy. Strictly new business has tapered however. Early July releases from automotive suppliers did not reflect any hesitancy due to the Michigan labor situation.

The only important news in the CHICAGO bar market is the determination of mills to hold to the 2.15c. price. Not a great deal of business has been received at this level as demand at the moment is comparatively quiet. Only in a few instances did large consumers cover at the 2.10c. net price for their requirements over the next few months. An important test of the 2.15c. price is expected later this month when automobile buying begins. Low dealer stocks will result in additional activity at farm equipment plants if demand increases in the fall.

The Bureau of Supplies and Accounts, Navy Department, will open bids on July 21 for 1550 tons of black and 200 tons of galvanized steel bars for the two 45,000-ton battleships under construction at the Brooklyn and Philadelphia Navy yards.

RAILROAD BUYING

. . . New York Board of Transportation may buy 150 subway cars

THE Board of Transportation, City of New York, is considering the purchase of 150 subway cars.

The Seaboard Air Line is taking bids on one and two seven-car lightweight coach trains.

Equipment orders placed with domestic builders in June totaled eight locomotives, 1324 freight cars and 14 passenger-train cars against 51 locomotives, 2051 freight cars and no passenger-train cars in May, according to *Railway Age*. Accumulative totals of purchases for the first six months of the present year are 152 locomotives, 9077 freight cars and 135 passenger-train cars, as compared with 75 locomotives, 8024 freight cars and 107 passenger-train cars in the comparable period of 1938. Equipment purchases still pending or contemplated amount to 31 locomotives, 3520 freight cars and 26 passenger-train cars.

Rail purchases in June, *Railway Age* reports, were 13,200 tons, bringing the total for the first half of this year to 515,808, as compared with 188,252 in the first half of 1938.

The Erie Railroad is understood to be contemplating the purchase of several thousand tons of rails, another step in its 1939 program started earlier this year.

SHIPBUILDING

. . . Two Seatrain ships call for 16,000 tons of plates and shapes

SUN Shipbuilding & Dry Dock Co., Chester, Pa., has received an order for two new seatrain vessels from Seatrain Lines, Inc., New York. Each ship will require about 8000 tons of plates and shapes; will cost, according to unofficial estimates, $1,800,000 and will carry 100 freight cars. Delivery will be made within 12 months. The ships will operate between New York and Texas City, Texas.

The Navy Department has postponed from July 6 to July 13 the date for opening bids for 21,300 tons of plates, sheets and strips for two 45,000-ton battleships, one building at the Brooklyn and the other at the Philadelphia Navy yard. The department meanwhile has sent out a notice to manufacturers limiting the sizes of plates and sheets to be incorporated in the schedule.

The Maritime Commission has dis-

patched telegrams to eight Pacific Coast shipbuilding companies, advising them that the commission is "desirous of seeing shipbuilding done on the West Coast." The commission, wired Chairman Emory S. Land, will do all it can within its power and within legal requirements to assure West Coast yards fair opportunity for obtaining contracts. The West Coast, he said, has facilities and has technical equipment sufficient for a healthy expansion of its shipbuliding industry.

STRUCTURAL STEEL

. . . Awards, new projects continue in small volume

STRUCTURAL awards and inquiries were light the past week, partly due to holiday influences, with the largest new project being 2500 tons for the Lackawack Dam in the Delaware aqueduct, New Ellenville, N. Y. The State Street section of the CHICAGO subway will require 1900 tons while 500 tons will be needed for a highway bridge in Erie County, Pa.

Ingalls Iron Works Co., BIRMINGHAM, will fabricate 1000 tons of steel for a Yale University building, while two bridges and a dormitory in the CHICAGO area, involving about 2000 tons, went to Bethlehem Steel Co. Bethlehem and Carnegie-Illinois Steel Corp. shared an order for 3200 tons of piling ordered for dike construction by the U. S. Engineers office at Providence, R. I. Carnegie-Illinois recently was awarded about 1100 tons of piling for the White River levee project in Arkansas.

TUBULAR GOODS

. . . Two large pipe lines pending
. . . Awards indefinite

TOTAL tubular goods sales at PITTSBURGH have shown little or no change in the past week. Oil country goods sales indicate a very slight increase over recently weekly averages. Miscellaneous line pipe orders have not been holding up recently, although substantial support would be given in case two fairly large lines now pending are awarded in the near future. A 16-in. line for the Northern Natural Gas Co. at Omaha, involving about 27,000 tons of steel, is pending, although it is not definite as to when the line will be awarded. The new line is to run from Sioux City to a point near Minneapolis, a distance of about 240 miles. Another pending pipe line, on which there is no definite information as to when it will be let, is the Standard Oil of Indiana, an 8-in. gasoline line to run from Sugar Creek, Mo., to Council Bluff, Iowa.

SHEETS AND STRIP

. . . General Motors strike holding up some flat rolled releases

ALTHOUGH sheet and strip specifications are not coming in quite as freely as was the case during the closing week of June, the volume of releases does not indicate a sharp reversal in trend. The closing down of some automobile plants because of union jurisdictional disputes has held up some shipments of flat rolled material which were originally scheduled for this week. If automobile companies continue to be harassed by these purely union disputes and should additional plants be shut down, sheet and strip releases will be substantially affected and shipping dates pushed ahead. Meanwhile, miscellaneous sheet and strip demand has leveled off slightly in the past week which may indicate that some consumers have received enough material for the time being to maintain current production schedules.

Electrical sheets have been active at CLEVELAND recently. Cold rolled strip steel sellers report good bookings and releases. The galvanized sheet market is quiet except for a little tonnage forced out by requirements of the construction industry.

Miscellaneous business accompanied by a small amount of automobile buying is the chief support of the CHICAGO sheet and strip market. Important releases against low priced orders now on the books are not expected until late this month and will probably extend through August into September. The automobile industry will be the chief source of this increased activity. Releases from makers of refrigerators and stoves are coming in at a rate considered normal by CHICAGO mills.

The movement of galvanized sheets to the farms is expected to get under way shortly. Meantime, jobbers in the ST. LOUIS area who have advantageous price protection are going slow about ordering shipments, waiting for a reduction of their stocks.

A sheet manufacturer has sent the following notice to its customers:

Effective immediately new specifications covering hot and cold rolled sheets will be accepted with the understanding that each item of an order shall be for a U. S. Standard gage number or for a definite gage weight or gage thickness and shall be subject to standard gage weight or gage thickness permissible variations applied equally over and under the ordered gage weight or gage thickness.

The above does not apply on blanket tonnage placed during the third and fourth quarter of the present year.

WIRE PRODUCTS

. . . Merchant business slow following heavy coverage in June

MERCHANT wire business at PITTSBURGH during the past week has been slow, but producers had anticipated this condition, as July is usually a poor month from a tonnage standpoint. However, manufacturers' wire demand has expanded slightly, with support coming mostly from miscellaneous manufacturers.

Incoming business at CLEVELAND consists principally of small orders from scattered areas all over the country. Although coverage was heavy during the latter part of June in merchant wire products, producers look for July to prove much better than the corresponding month last year.

CHICAGO wire sellers are cheerful over present business and future prospects. Demand for merchant wire products is holding up quite well and lately there has been increased activity in industrial accounts, chiefly miscellaneous. Late this month and next local consumers who supply the automobile industry will be looked to for their specifications for 1940 cars, and, in the fall, when farmers leave their fields, another spurt in merchant products is probable.

REINFORCING BARS

. . . Period after holiday shows drop in bookings

AWARDS the past week were a third below the previous week, the largest contracts being 3000 tons for a section of the Chicago subway to Ceco Steel Products Co., Chicago, and 1575 tons for a Huntington W. Va., flood wall to West Virginia Rail Co., Huntington.

Specifications are reported holding up well at PITTSBURGH and the current dullness in the market is considered temporary. In the CHICAGO district, a housing project will require

2500 tons of bars, an armory building 800 tons and a Commonwealth Edison Co. addition 600 tons, while numerous small jobs are expected to materialize shortly. Sixteen hundred tons will be required for a channel improvement project for the U. S. Army at Hornell, N. Y. The Delaware aqueduct will need 3000 tons of bars at New Ellenville, N. Y.

Bids have been set for Aug. 8 by the U. S. engineer, Portland, for Mud Mountain Dam near Enumclaw, Wash., requiring 2850 tons of reinforcing steel and 1200 tons of plates. The Bureau of Reclamation has taken bids on 1800 tons for the All-American Canal to be shipped to Niland, Cal.

PLATES

. . . Better releases in late June aid rolling operations

SOME of the plate mills have better rolling schedules this month owing to slightly heavier releases in late June. Shipbuilding tonnage is a factor at several mills. Atlantic Coast shipyards are now the busiest they have been since the World War.

Two car ferries to be built by the Sun Shipbuilding & Dry Dock Co., Chester, Pa., for the Seatrain Lines, Inc., New York, will take 16,000 tons of plates and shapes.

Bids for Mud Mountain Dam near Enumclaw, Wash., which calls for 1200 tons of plates as well as 2850 tons of reinforcing bars, will be taken Aug. 8 by the United States Engineer.

Ohio fabricators have been providing releases more generously recently. An Akron boiler works is more active and YOUNGSTOWN fabricators are particularly busy. Recent awards include 625 tons of plates for the Warren blast furnace alterations of Republic Steel Corp. given to William B. Pollock Co., Youngstown; 612 tons of liner plates for the Tuscarora Mountain tunnel and 845 tons for the Allegheny Mountain tunnel, both awarded to Commercial Shearing & Stamping Co., Youngstown; and 240 tons for a Detroit tunnel job placed with Youngstown Steel Car Corp. Several large tonnages will be up for bids soon in Ohio.

TIN PLATE

. . . Operations lower at 64% . . . Peak may have been passed

TIN plate operations this week are estimated at 64 per cent, down four points from the level existing previous to the holiday shutdowns. Activity last week had been roughly estimated at 50 to 55 per cent. Operations appear to be leveling off and the same conditions apply to new tin plate business. Some sources believe that the peak of production has been passed and that tin plate activity will taper off slowly in the near future.

BOLTS, NUTS AND RIVETS

. . . New business slack . . . Shipments in fair volume

SHIPMENTS to jobbers against the commitments of late June are holding up, but new business temporarily is slack from most consuming fields, due to the season.

Imports at Philadelphia

PHILADELPHIA—The following iron and steel imports were received here during the past week: 1625 tons of chrome ore from South Africa; 63 tons of ferromanganese from The Netherlands; 5 tons of hoop steel, 78 tons of steel bands, 55 tons of steel bars and 176 tons of structural shapes from Belgium; 11 tons of steel bands, 9 tons of steel bars and 34 tons of structural shapes from France.

Shipbuilding Activity at War Level in Pennsylvania

WITH shipyards in eastern Pennsylvania operating at a level unequaled since the World War, much of the support of current rolling schedules of mills in that area is coming from the shipyards. All the shipyards in that district are now fully occupied and there is a possibility that the long idle Cramp shipyard in Philadelphia may be reopened.

The Philadelphia city council will hold a public hearing tomorrow night (Friday) to consider plans for the reopening of this yard. It is understood that tax delinquency is the chief obstacle to be overcome.

A recent survey by the Philadelphia *Evening Public Ledger* showed that 32 ships of various types, representing a total contract value of over $250,000,000, are either on the ways or in the planning stage in yards along the Delaware River between Philadelphia and Wilmington. These yards provide employment for 19,000 workers.

Auto Sales Advance 57% In First Half of 1939

DETROIT—An over-all gain of 57 per cent in the number of passenger cars sold in the first half of 1939 is reported by the Automobile Manufacturers Association. The total for the first six months of this year is 2,045,670 passenger cars compared with only 1,305,501 in the corresponding period last year. Great gains were registered in June when automobile sales reached a total of 322,670, estimated 3 per cent higher than May and 70 per cent greater than June, 1938.

Republic Steel Corp. has reestablished its Birmingham district executive offices in the Empire Building. They have been at the Thomas plant since the early part of the year.

Weekly Bookings of Construction Steel

	Week Ended				Year to Date	
	July 11, 1939	July 3, 1939	June 13, 1938	July 12, 1938	1939	1938
Fabricated structural steel awards	7,950	21,250	17,500	8,000	542,425	365,230
Fabricated plate awards	625	2,380	14,580	1,815	93,980	71,620
Steel sheet piling awards	6,810	0	3,325	0	39,965	26,820
Reinforcing bar awards	6,575	9,800	7,000	15,930	263,495	138,625
Total Letting of Construction Steel..	21,960	33,430	42,405	25,745	939,865	602,295

IRON AND STEEL SCRAP

. . . Strength develops in No. 1 heavy melting steel at Pittsburgh and Cleveland . . . Composite price rises to $14.79.

COINCIDENT with a recovery in steel operations in most districts after the holiday week curtailment, steel scrap prices are firmer. In the Cleveland district two companies have made sizable purchases, resulting in a rise in quotations there on steel scrap of 50c. a ton. A large railroad list brought $16.25 for that portion of it which was sold for export, while another portion, sold to domestic mills, brought a higher figure. The Pittsburgh and Youngstown markets are stronger, quotations on steel grades having been raised 25c. a ton.

At Chicago the quotations of $13.25 to $13.50 for No. 1 steel scrap are unchanged, but the situation is firmer in that brokers are finding it difficult to buy at $13.25, and in some instances have paid $13.50. A rise in prices is foreshadowed at Philadelphia, where a strong export demand coupled with an improving domestic situation has put the current $15.50 quotation in a strong position.

The advance at Pittsburgh raises THE IRON AGE scrap composite price to $14.79. The ground lost since the second week of June, when the composite price was at the same figure, has been recovered, but the average is still 50c. a ton below the year's peak of $15.29 reached in the last week of March.

Chicago

The Chicago scrap market continues very quiet for the third consecutive week. Heavy melting steel is unchanged at $13.25 to $13.50, although brokers are finding it a little more difficult to buy at $13.25 than was the case a week ago. Railroads are receiving around $14 or more a gross ton delivered. Brokers are paying $13.50 in a few cases, especially for tonnages of 500 tons or more.

Philadelphia

With melting operations back at the pre-holiday level, scrap supplies are again moving into plants at a normal rate and domestic buyers are showing interest in the market. Export requirements, assisted modestly by domestic needs, continue to absorb all material that enters the market. Quotations on No. 1 and No. 2 steel are unchanged at a flat $15.50 and $13.50 respectively, but the strength of the present market situation makes it not improbable that higher prices will rule shortly. Although there have been recent sales at both these prices, it is known that one dealer has been forced to pay these prices in covering on an old order. Heavy breakable cast is also showing new life and is very strong on the high side of the present price of $14.50 to $15. It would apparently be difficult to purchase this grade at the lower end of the spread. Some distress supplies of machine shop turnings were sold recently at $8, but more lately several lots were bought at $8.50, the present quoted price. The recent Budd bundles are reported to have gone at better than $14.50, f.o.b. the Budd plant.

Pittsburgh

The market undertone continues strong with some apparently mixed conditions. Brokers' prices for No. 1 heavy melting steel in this district range from $14.75 for odd cars to as high as $15.75 in isolated cases. Some of this strength has developed within the past few days owing to fairly sizable consumer purchases in nearby markets, coupled with the continuance of strong export demand. One mill which recently paid $15.25 for No. 1 heavy melting is offering no higher than this figure for additional tonnage, but other points in the district within the past few days have paid at least equivalent to $15.75 a ton for No. 1 steel. Meanwhile, railroad heavy melting steel is 25c. a ton higher on the basis of a recent domestic sale into consumption and also because of another list going for export at around $16.25 a ton. Railroad heavy melting steel is quotable this week at $16.25 to $16.75. An appraisal of the No. 1 heavy steel market warrants a quotation on this grade of $15.25 to $15.75, up 25c. from last week's quotation.

Buffalo

A 1000-ton sale of mixed grade was made this week to a large consumer in the district on the basis of $13 to $13.50 for No. 1 heavy melting steel. At the same time 6000 tons of No. 2 heavy melting steel was purchased by another consumer at a price reported to be $12 to $12.50. Scrap is now moving more freely, total suspension of shipments having been lifted at one mill and restrictions lightened at another.

Cleveland

Sales into mill consumption here within the past few days have strengthened the quotable range on No. 1 heavy melting steel and allied grades. No. 1 is now $14.50 to $15, up 50c. per ton. Two steel producers distributed sizable orders. In addition, activity down state remains good, particularly at Warren. The principal local railroad list went for export at around $16.25. Other lists commanded good prices, one of the largest going to the Pittsburgh district.

Youngstown

On the basis of new mill sales, No. 1 heavy melting steel is up 25c. per ton to a quotable range of $15.25 to $15.75. Open-hearth operations have returned this week to the level prevailing prior to the holiday and additional mill buying may materialize. Meanwhile, over the next few weeks available supplies of scrap are not expected to become overly large, due to the fact manufacturing operations of many plants will be curtailed.

St. Louis

The scrap iron market is quiet, with no deals pending, but strong because of the slow movement of material from country dealers, who say their receipts are light because present prices and high freigh rates and labor costs are incompatible with profits. Machine shop turnings are 50c. a ton lower. Railroad lists: Baltimore & Ohio, 4600 tons; Wabash, 1800 tons; Missouri Pacific, 1000 tons; Alton, 200 tons; Ann Arbor, 150 tons.

Cincinnati

The iron and steel scrap market in this area shows no change. Prices are being well sustained and the market generally appears to have a strong undertone. While no new commitments are reported, dealers indicate that shipments are being accepted on current contracts at a fairly good rate. Although all open hearths at the Middletown unit of American Rolling Mill Co. have been cooled for the month, scrap is being accepted right along.

Detroit

Prices of scrap in the Detroit area are unchanged and a generally dull month is anticipated. Some tonnage will be open for bids during the current week with auto body scrap predominating.

New York

Prices for iron and steel scrap in the New York market, both for domestic and export shipment, are unchanged. Eastern Pennsylvania mills are taking scrap a little more freely owing to slightly better operations. Export shipments to one or two countries have been delayed owing to the slowness of these countries in arranging credits, but there have been no serious holdups.

Boston

The Weirton Steel Co. has withdrawn from the market for steel turnings for which $3.38 a ton on cars was offered. A textile machinery maker, formerly paying $13.50 to $14 a ton delivered for machinery cast, has dropped its price to $12.50 a ton, the price being paid by another buyer. Both concerns have accumulated large stocks of this material. The American Steel & Wire Co. is expected to enter the market before July ends.

The export market continues active with prices very firm. Intimations are better than $14 a ton on dock would be paid for No. 1 steel provided a large tonnage was available, but to date $14 a ton remains the market top. It is also intimated $14 a ton delivered dock would be paid for a sizable tonnage of real No. 1 machinery cast.

Toronto

Iron and steel scrap markets show little life, although one or two lines of material are moving in fair volume. The steel mills are taking delivery against contracts and there is fair demand for bundled steel scrap as well as heavy melting, but other lines such as turnings, borings, clippings and bushelings, are at a standstill. Good movement is reported in machinery cast, but despite betterment in sales in this material stocks are increasing in yards. Stove plate has no demand at this time. Yards are fairly well stocked and some dealers state that with business in its present condition staffs have been greatly reduced. No indications of price changes are revealed.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$15.25 to	$15.75
Railroad hvy. mltng..	16.25 to	16.75
No. 2 hvy. mltng. steel.	13.75 to	14.25
Scrap rails	16.00 to	16.50
Rails 3 ft. and under..	17.50 to	18.00
Comp. sheet steel	15.25 to	15.75
Hand bundled sheets..	14.25 to	14.75
Hvy. steel axle turn..	13.50 to	14.00
Machine shop turn....	9.00 to	9.50
Short shov. turn.....	10.50 to	11.00
Mixed bor. & turn....	8.00 to	9.00
Cast iron borings.....	8.00 to	9.00
Cast iron carwheels...	14.50 to	15.00
Hvy. breakable cast...	12.50 to	13.00
No. 1 cupola cast.....	15.00 to	15.50
RR. knuckles & cplrs..	17.50 to	18.00
Rail coil & leaf springs	18.00 to	18.50
Rolled steel wheels....	18.00 to	18.50
Low phos. billet crops.	18.50 to	19.00
Low phos. punchings..	17.50 to	18.00
Low phos. plate	16.00 to	17.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.		$15.50
No. 2 hvy. mltng. steel.		13.50
Hydraulic bund., new.	$15.00 to	$15.50
Hydraulic bund., old..	11.50 to	12.00
Steel rails for rolling.	17.00 to	17.50
Cast iron carwheels...	....	16.00
Hvy. breakable cast...	14.50 to	15.00
No 1 cast	16.00 to	16.50
Steel plate (steel wks.)	12.50 to	13.00
Railroad malleable ...	15.50 to	16.00
Machine shop turn....	8.00 to	8.50
No. 1 blast furnace....	6.50 to	7.00
Cast borings	6.50 to	7.00
Heavy axle turnings..	10.00 to	10.50
No. 1 low phos. hvy...	17.00 to	17.50
Couplers & knuckles..	17.00 to	17.50
Rolled steel wheels....	17.00 to	17.50
Steel axles	20.00 to	20.50
Shafting	20.50 to	21.00
Spec. iron & steel pipe	12.00 to	12.50
No. 1 forge fire.....	12.00 to	12.50
Cast boring (chem.)..	9.50 to	10.00

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton	
Hvy. mltng. steel	$13.25 to	$13.50
Auto. hvy. mltng. steel alloy free	11.75 to	12.25
No. 2 auto steel	10.25 to	10.75
Shoveling steel	13.25 to	13.50
Factory bundles	12.25 to	12.75
Dealers' bundles	11.25 to	11.75
Drop forge flashings...	9.25 to	9.75
No. 1 busheling	11.75 to	12.25
No. 2 busheling, old...	5.25 to	5.75
Rolled carwheels	14.50 to	15.00
Railroad tires, cut ...	15.00 to	15.50
Railroad leaf springs..	14.50 to	15.00
Steel coup. & knuckles	14.25 to	14.75
Axle turnings	12.50 to	13.00
Coil springs	16.50 to	17.00
Axle turn. (elec.).....	13.50 to	14.00
Low phos. punchings..	15.50 to	16.00
Low phos. plates 12 in. and under	15.00 to	15.50
Cast iron borings	6.50 to	7.00
Short shov. turn.....	6.50 to	7.00
Machine shop turn....	6.50 to	7.00
Rerolling rails	18.00 to	18.50
Steel rails under 3 ft..	16.00 to	16.50
Steel rails under 2 ft..	16.50 to	17.00
Angle bars, steel	15.25 to	15.75
Cast iron carwheels ..	12.50 to	13.00
Railroad malleable	15.00 to	15.50
Agric. malleable	12.00 to	12.50
	Per Net Ton	
Iron car axles	$18.00 to	$18.50
Steel car axles	17.50 to	18.00
Locomotive tires	13.00 to	13.50
Pipes and flues	8.50 to	9.00
No. 1 machinery cast.	12.00 to	12.50
Clean auto. cast	12.50 to	13.00
No. 1 railroad cast....	11.00 to	11.50
No. 1 agric. cast	10.00 to	10.50
Stove plate	7.75 to	8.25
Grate bars	7.75 to	8.25
Brake shoes	9.50 to	10.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$15.25 to	$15.75
No. 2 hvy. mltng. steel.	14.25 to	14.75
Low phos. plate	16.25 to	16.75
No. 1 busheling	14.25 to	14.75
Hydraulic bundles	14.75 to	15.25
Machine shop turn....	9.00 to	9.50

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$14.50 to	$15.00
No. 2 hvy. mltng. steel.	13.50 to	14.00
Comp. sheet steel	14.00 to	14.50
Light bund. stampings	9.75 to	10.25
Drop forge flashings..	11.50 to	12.00
Machine shop turn....	7.50 to	8.00
Short shov. turn.	8.00 to	8.50
No. 1 busheling	13.00 to	13.50
Steel axle turnings....	10.50 to	11.00
Low phos. billet and bloom crops	17.50 to	18.00
Cast iron borings	8.00 to	8.50
Mixed bor. & turn....	8.00 to	8.50
No. 2 busheling	8.25 to	8.75
No. 1 cupola cast	15.50 to	16.00
Railroad grate bars...	11.00 to	11.50
Stove plate	9.00 to	9.50
Rails under 3 ft.	17.75 to	18.25
Rails for rolling	17.50 to	18.00
Railroad malleable ...	15.00 to	15.50
Cast iron carwheels ..	13.50 to	14.00

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$13.00 to	$13.50
Railroad hvy. mltng...	13.50 to	14.00
No. 2 hvy. mltng. steel.	12.00 to	12.50
Scrap rails	13.50 to	14.00
New hvy. b'ndled sheets	12.00 to	12.50
Old hydraul. bundles..	10.00 to	10.50
Drop forge flashings...	12.00 to	12.50
No. 1 busheling	12.00 to	12.50
Machine shop turn.....	6.00 to	6.50
Knuckles & couplers..	15.00 to	15.50
Coil & leaf springs....	15.00 to	15.50
Rolled steel wheels....	15.00 to	15.50
Shov. turnings	7.00 to	7.50
Mixed bor. & turn....	7.00 to	7.50
Cast iron borings	7.00 to	7.50
No. 1 machinery cast..	15.00 to	16.00
No. 1 cupola cast.	14.50 to	15.00
Stove plate	13.00 to	13.50
Steel rails under 3 ft..	18.00 to	18.50
Cast iron carwheels...	13.50 to	14.00
Railroad malleable	15.00 to	15.50

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting.	$11.75 to	$12.25
No. 1 hvy. melting....	11.50 to	12.00
No. 2 hvy. melting....	10.50 to	11.00
No. 1 locomotive tires.	12.25 to	12.75
Misc. stand. sec. rails.	12.50 to	13.00
Railroad springs	14.00 to	14.50
Bundled sheets	7.00 to	7.50
No. 1 busheling	7.50 to	8.00
Cast. bor. & turn.....	2.50 to	3.00
Machine shop turn....	4.50 to	5.00
Heavy turnings	9.00 to	9.50
Rails for rolling	16.00 to	16.50
Steel car axles	17.00 to	17.50
No. 1 RR. wrought....	9.75 to	10.25
No. 2 RR. wrought....	11.50 to	12.00
Steel rails under 3 ft..	16.00 to	16.50
Steel angle bars	13.00 to	13.50
Cast iron carwheels...	14.00 to	14.50
No. 1 machinery cast..	14.50 to	15.00
Railroad malleable ...	12.00 to	12.50
No. 1 railroad cast....	12.00 to	12.50
Stove plate	7.50 to	8.00
Grate bars	8.50 to	9.00
Brake shoes	9.50 to	10.00

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel.	$11.00 to	$11.50
No. 2 hvy. mltng. steel.	8.75 to	9.25
Scrap rails for mltng.	14.50 to	15.00
Loose sheet clippings.	6.50 to	7.00
Hydru. b'ndled sheets	10.50 to	11.00
Cast iron borings	3.25 to	3.75
Machine shop turn....	4.50 to	5.00
No. 1 busheling	7.25 to	7.75
No. 2 busheling	2.25 to	2.75
Rails for rolling	16.50 to	17.00
No. 1 locomotive tires.	13.25 to	13.75
Short rails	17.25 to	17.75
Cast iron carwheels...	12.50 to	13.00
No. 1 machinery cast..	12.00 to	12.50
No. 1 railroad cast...	12.00 to	12.50
Burnt cast	6.25 to	6.75
Stove plate	6.25 to	6.75
Agricul. malleable	10.75 to	11.25
Railroad malleable	13.25 to	13.75
Mixed hvy. cast	10.50 to	11.00

BIRMINGHAM

Per gross ton delivered to consumer:

Hvy. melting steel....	....	$13.00
Scrap steel rails	$13.50 to	14.00
Short shov. turnings..	....	7.50
Stove plate	....	9.50
Steel axles	....	18.50
Iron axles	....	18.50
No. 1 RR. wrought.....	....	10.00
Rails for rolling	16.00 to	16.50
No. 1 cast.	....	15.00
Tramcar wheels	14.50 to	15.00

DETROIT

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. industrial steel	$10.00 to	$10.50
No. 2 hvy. mltng. steel.	9.00 to	9.50
Borings and turnings..	5.00 to	5.50
Long turnings	4.75 to	5.25
Short shov. turnings..	5.75 to	6.25
No. 1 machinery cast..	12.50 to	13.00
Automotive cast	13.00 to	13.50
Hvy. breakable cast...	9.00 to	9.50
Stove plate	7.75 to	8.25
Hydraul. comp. sheets.	11.25 to	11.75
New factory bushel....	9.50 to	10.00
Sheet clippings	7.25 to	8.25
Flashings	9.50 to	10.00
Low phos. plate scrap.	11.00 to	11.50

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel.	$11.00 to	$11.50
No. 2 hvy. mltng. steel.	8.50 to	9.00
Hvy. breakable cast...	10.50 to	11.00
No. 1 machinery cast.	11.50 to	12.00
No. 2 cast	9.50 to	10.00
Stove plate	9.50 to	10.00
Steel car axles	15.00 to	15.50
Shafting	15.00 to	15.50
No. 1 RR. wrought....	11.00 to	11.50
No. 1 wrought long....	9.50 to	10.00
Spec. iron & steel pipe	9.00 to	9.50
Rails for rolling	16.00 to	16.50
Clean steel turnings*..	4.00 to	4.50
Cast borings*	3.50 to	4.00
No. 1 blast furnace....	3.50 to	4.00
Cast borings (chem.)..	9.50 to	10.00
Unprepared yard scrap	6.00 to	6.50
Light iron	3.00 to	3.50

Per gross ton, delivered local foundries:

No. 1 machn. cast†....	$13.50 to	$14.00
No. 2 cast†	10.50 to	11.00

* $1.50 less for truck loads.
† Northern N. J. prices are $2 to $2.50 higher.

BOSTON

Dealers' buying prices per gross ton:

Breakable cast	....	$9.40
Machine shop turn....	....	3.38
Mixed bor. & turn....	....	2.25
Bun. skeleton long....	....	7.65
Shafting	15.25 to	15.50
Cast bor. chemical....	5.00 to	6.00

Per gross ton delivered consumers' yards:

Textile cast	$13.50 to	$14.00
No. 1 machine cast....	13.00 to	14.00

Per gross ton delivered dealers' yards:

No. 1 hvy. mltng. steel.	$11.75 to	$12.00
No. 2 steel	10.50 to	10.75

PACIFIC COAST

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$13.00 to	$13.50
No. 2 hvy. mltng. steel.	12.50 to	13.00

CANADA

Dealers' buying prices at their yards, per gross ton:

	Toronto	Montreal
No. 1 hvy. mltng. steel.	$9.25	$8.75
No. 2 hvy. mltng. steel.	8.00	7.50
Mixed dealers steel....	6.75	6.25
Drop forge flashings...	8.25	7.75
New loose clippings...	4.25	3.75
Busheling	3.75	3.25
Scrap pipe	4.25	3.75
Steel turnings	4.25	3.75
Cast borings	3.75	3.25
Machinery cast	14.00	13.50
Dealers cast	12.00	11.50
Stove plate	8.00	7.50

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges

No. 1 hvy. mltng. steel.	$12.00 to	$12.50
No. 2 hvy. mltng. steel.	10.50 to	11.00
No. 2 cast	10.50 to	11.00
Stove plate	9.50 to	10.00

Boston on cars at Army Base or Mystic Wharf

No. 1 hvy. mltng. steel.	$13.75 to	$14.00
No. 2 hvy. mltng. steel.	12.75 to	13.00
Rails (scrap)	14.00 to	14.25

Philadelphia, delivered alongside boats, Port Richmond.

No. 1 hvy. mltng. steel.	$15.00 to	$15.25
No. 2 hvy. mltng. steel.	13.50 to	13.75

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

Steel prices on these pages are base prices only and f.o.b. mill unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases the amount of freight which must be absorbed in order to meet competition.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are $2 higher. F.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Gross Ton
Pittsburgh, Chicago or Cleveland	$43.00
Worcester, Mass.	45.00
Birmingham	43.00
San Francisco	52.00

Rods over 9/32 in. or 47/64 in., inclusive, $5 a ton over base.

SOFT STEEL BARS

	Base per Lb.
Pittsburgh, Chicago, Gary, Cleveland, Buffalo and Birmingham	2.15c.
Detroit, delivered	2.25c.
Duluth	2.25c.
Philadelphia, delivered	2.47c.
New York	2.49c.
On cars dock Gulf ports	2.50c.
On cars dock Pacific ports	2.75c.

RAIL STEEL BARS

(For merchant trade)

Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.00c.
On cars dock Tex. Gulf ports	2.45c.
On cars dock Pacific ports	2.70c.

BILLET STEEL REINFORCING BARS

(Straight lengths as quoted by distributers)

Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Cleveland, Youngstown or Sparrows Pt.	1.80c. to 2.05c.
Detroit, delivered	1.90c. to 2.15c.
On cars dock Tex. Gulf ports	2.15c. to 2.40c.
On cars dock Pacific ports	2.50c.

RAIL STEEL REINFORCING BARS

(Straight lengths as quoted by distributers)

Pittsburgh, Chicago, Gary, Buffalo, Cleveland, Youngstown or Birmingham	1.70c. to 1.90c.
Detroit, delivered	1.80c. to 2.00c.
On cars dock Tex. Gulf ports	2.05c. to 2.25c.
On cars dock Pacific ports	2.35c.

IRON BARS

Chicago and Terra Haute	2.15c.
Pittsburgh (refined)	3.60c.

COLD FINISHED BARS AND SHAFTING*

Pittsburgh, Buffalo, Cleveland, Chicago, and Gary	2.65c.
Detroit	2.70c.

* In quantities of 10,000 to 19,999 lb.

PLATES

	Base per Lb.
Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont, Del.	2.10c.*
Philadelphia, del'd	2.05c. to 2.15c.
New York, del'd	2.19c. to 2.29c.
On cars dock Gulf ports	2.45c.
On cars dock Pacific ports	2.60c.
Wrought iron plates, P'tg	3.80c.

* Subject to concessions, particularly in the East, of $2 a ton.

FLOOR PLATES

Pittsburgh or Chicago	3.35c.
New York, del'd	3.71c.
On cars dock Gulf ports	3.70c.
On cars dock Pacific ports	3.95c.

STRUCTURAL SHAPES

	Base per Lb.
Pittsburgh, Chicago, Gary, Buffalo, Bethlehem or Birmingham	2.10c.
Philadelphia, del'd	2.215c.
New York, del'd	2.27c.
On cars dock Gulf ports	2.45c.
On cars dock Pacific ports	2.70c.

STEEL SHEET PILING

	Base per Lb.
Pittsburgh, Chicago or Buffalo	2.40c.
On cars dock Gulf ports	2.85c.
On cars dock Pacific ports	2.90c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$40.00
Angle bars, per 100 lb.	2.70

F.o.b. Basing Points

Light rails (from billets) per gross ton	$40.00
Light rails (from rail steel) per gross ton	39.00

	Base per Lb.
Cut spikes	3.00c.
Screw spikes	4.55c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast ports	2.25c.
Track bolts, to steam railroads	4.15c.
Track bolts to jobbers, all sizes (per 100 counts)	65-5

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS

Hot Rolled

	Base per Lb.
Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown or Chicago	2.00c.
Detroit, delivered	2.10c.
Philadelphia, delivered	2.17c.
Granite City	2.10c.
On cars dock Pacific ports	2.50c.
Wrought iron, Pittsburgh	4.10c.

Cold Rolled*

Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown or Chicago	3.05c.
Detroit, delivered	3.15c.
Granite City	3.15c.
Philadelphia, delivered	3.37c.
On cars dock Pacific ports	3.65c.

* Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base.

From May 10 up to and including May 15, reductions from the base price of hot and cold rolled sheets running from $4 to $8 a ton were prevalent. Concessions withdrawn, on May 15.

Subsequent to May 15, many orders originally placed at $4 to $6 below the base price were adjusted to the full $8 concession.

Galvanized Sheets, 24 Gage

Pittsburgh, Chicago, Gary, Sparrows Point, Buffalo, Middletown, Youngstown or Birmingham	3.50c.
Philadelphia, delv'd	3.67c.
Granite City	3.60c.
On cars dock Pacific ports	4.00c.
Wrought iron, Pittsburgh	6.10c.

Electrical Sheets

(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.55c.
Transformer 52	8.45c.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extra plus 25c per 100 lb. for coils. Pacific ports add 70c. a 100 lb

Long Ternes

No. 24 unassorted 8-lb. coating f.o.b. Pittsburgh or Gary	3.80c.
F.o.b. cars dock Pacific ports	4.50c.

Vitreous Enameling Stock, 20 Gage*

Pittsburgh, Chicago, Gary, Youngstown, Middletown or Cleveland	3.35c.
Detroit, delv'd	3.45c.
Granite City	3.45c.
On cars dock Pacific ports	3.95c.

TIN MILL PRODUCTS

***Tin Plate**

	Per Base Box
Standard cokes, Pittsburgh, Chicago and Gary	$5.00
Standard cokes, Granite City	5.10

* Prices effective Nov. 10 on shipments through first quarter of 1939.

Special Coated Manufacturing Ternes

	Per Base Box
Granite City	$4.10
Pittsburgh or Gary	4.30

Roofing Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 112 sheets, 20 x 28 in.)

8-lb. coating I.C.	$12.00
15-lb. coating I.C.	14.00
20-lb. coating I.C.	15.00
25-lb. coating I.C.	16.00
30-lb. coating I.C.	17.25
40-lb. coating I.C.	19.50

Black Plate, 29 gage and lighter

Pittsburgh, Chicago and Gary	3.05c.
Granite City	3.15c.
On cars dock Pacific ports, boxed	4.00c.

HOT ROLLED STRIP

(Widths up to 12 in.)

	Base per Lb
Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown or Birmingham	2.00c.
Detroit, delivered	2.10c.

Cooperage Stock

Pittsburgh & Chicago	2.10c.

From May 10 up to and including May 15, reductions in the base price of hot rolled strip running from $4 to $8 a ton were prevalent. Concessions withdrawn on May 15.

Subsequent to May 15, many orders originally placed at $4 to $6 below the base price were adjusted to the full $8 concession.

COLD ROLLED STRIP*

	Base per Lb
Pittsburgh, Youngstown or Cleveland	2.80c.
Chicago	2.90c.
Detroit, delivered	2.90c.
Worcester	3.00c.

* Carbon 0.25 and less.

Commodity Cold Rolled Strip

Pittsburgh, Youngstown, or Cleveland	2.95c.
Detroit, delivered	3.05c.
Worcester	3.35c.

From May 10 up to and including May 15, reductions from the base price of cold rolled strip amounting to $4 a ton were prevalent. Concessions withdrawn on May 15.

COLD ROLLED SPRING STEEL

		Pittsburgh and Cleveland	Worcester
Carbon	0.26-0.50%	2.80c.	3.00c.
Carbon	0.51-0.75	4.30c.	4.50c.
Carbon	0.76-1.00	6.15c.	6.35c.
Carbon	1.01-1.25	8.35c.	8.55c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh, Chicago, Cleveland and Birmingham)

To Manufacturing Trade

	Per Lb.
Bright wire	2.60c.
Galvanized wire, base	2.65c.*
Spring wire	3.20c.

* On galvanizing wire to manufacturing trade, size and galvanizing extras are charged, the price Nos. 6 to 9 gage, inclusive, thus being 3.15c.

To the Trade

	Base per Keg
Standard wire nails	$2.40
Coated nails	2.40
Cut nails, carloads	3.60

	Base per 100 Lb.
Annealed fence wire	$2.90
Galvanized fence wire	3.30
Polished staples	3.10
Galvanized staples	3.35
Twisted barbless wire	3.25
Woven wire fence, base column.	67
Single loop bale ties, base col...	56
Stand. 2 pt., 12.5 gage barbed cattle wire, per 80 rod spool...	$2.58
Stand. 2 pt., 12.5 gage barbed hog wire, per 80 rod spool....	$2.74

Note: Birmingham base same on above items, except spring wire.

Add $4 a ton for Mobile, Ala.; $5 for New Orleans; $6 for Lake Charles to above bases, except on galvanized and annealed merchant fence wire, which are $1 a ton additional in each case.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel In.	Black	Galv.	*Wrought Iron* In.	Black	Galv.
⅛	.56	36	⅛ & ¼	+9	+30
¼ to ⅜	.59	43½	½	.24	6½
½	.63½	54	¾	.30	13
¾	.66½	58	1 & 1¼	.34	19
1 to 3	.68½	60½	1½	.38	21½
			2	.37½	21

Lap Weld

2	.61	52½	2	.30½	15
2½ & 3	.64	55½	2½ to 3½	31½	17½
3½ to 6.66		57½	4	.33½	21
7 & 8.65		55½	4½ to 8.32½		20
9 & 10.64½		55	9 to 12.	.28½	15
11 & 12.63½		54			

Butt weld, extra strong, plain ends

⅛	.54½	41½	⅛ & ¼	+10	+43
½ to ⅜	.56½	45½	½	.25	9
½	.61½	37½	¾	.31	15
¾	.65½	57½	1 to 2	.38	22½
1 to 3	.67	60			

Lap weld, extra strong, plain ends

2	.59	51½	2	.33½	18½
2½ & 3	.63	55½	2½ to 4.39½		25½
3½ to 6.66½		59	4½ to 6.37½		24
7 & 8.65½		56	7 & 8.	.38½	24½
9 & 10.64½		55	9 to 12.	.32	20½
11 & 12.63½		54			

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher, on all butt weld 8 in. and smaller.

Boiler Tubes

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall.
(Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld Hot Rolled
1 in. o.d. 13 B.W.G.	$ 9.01	$ 7.82	....
1¼ in. o.d. 13 B.W.G.	10.67	9.26	....
1½ in. o.d. 13 B.W.G.	11.70	10.23	$9.72
1¾ in. o.d. 13 B.W.G.	13.42	11.64	11.06
1 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2¼ in. o.d. 13 B.W.G.	16.76	14.54	13.79
2¼ in. o.d. 12 B.W.G.	18.45	16.01	15.16
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
2¾ in. o.d. 12 B.W.G.	21.42	18.59	17.54
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66
4½ in. o.d. 10 B.W.G.	43.04	37.35	35.22
5 in. o.d. 9 B.W.G.	54.01	46.87	44.25
6 in. o.d. 7 B.W.G.	82.93	71.96	68.14

Extras for less carload quantities:

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

CAST IRON WATER PIPE

Per Net Ton

*6-in. and larger, del'd Chicago.	$51.00
6-in. and larger, del'd New York	49.00
*6-in. and larger, Birmingham.	43.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles....	52.00
F.o.b. dock, Seattle	52.00
4-in. f.o.b. dock, San Francisco or Los Angeles	55.00
F.o.b. dock, Seattle	52.00

Class "A" and gas pipe, $3 extra
4-in. pipe is $3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $42, Birmingham, and $5 delivered Chicago and 4-in. pipe, $45, Birmingham, and $54 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland Birmingham or Chicago)

Per Cent Off List

Machine and carriage bolts:	
½ in. and 6 in. and smaller....	68½
Larger and longer up to 1 in..	66
1⅛ in. and larger	64
Lag bolts	66
Plow bolts, Nos. 1, 2, 3, and 7	68½
Hot pressed nuts, and c.p.c. and t-nuts, square or hex. blank or tapped:	
½ in. and smaller	67
9/16 in. to 1 in. inclusive.....	64
1⅛ in. and larger	62

On the above items with the exception of plow bolts, there is an additional allowance of 10 per cent for full container quantities.

On all of the above items, there is an additional 5 per cent allowance for carload shipments.

	U.S.S.	S.A.E.
Semi-fin. hexagon nuts ½ in. and smaller	67	70
9/16 to 1 in.	64	65
1⅛ in. and larger	62	62

In full container lots, 10 per cent additional discount.

Stove bolts in packages, nuts attached	72½
Stove bolts in packages, with nuts separate	72½ and 12½
Stove bolts in bulk	84

On stove bolts freight is allowed to destination on 200 lb. and over.

Large Rivets

(½ in. and larger)

Base Per 100 Lb.

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham $3.40

Small Rivets

(7/16 in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland Chicago, Birmingham .... 65 and 10

Cap and Set Screws

(Freight allowed to destination)

Per Cent Off List

Milled hexagon head, cap screws, 1 in. dia. and smaller	50 and 10
Milled headless set screws, cut thread ¾ in. and smaller	70
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	67½
Upset set screws, cup and oval points	75
Milled studs	60

Alloy Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, $56.00 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.
Open-hearth grade, base ..... 2.70c.
Delivered, Detroit ..... 2.80c.

S.A.E. Series Numbers	Alloy Differential per 100 Lb.
2100 (1½% Nickel)	$0.75
2300 (3½% Nickel)	1.55
2500 (5% Nickel)	2.25
3100 Nickel-chromium	0.70
3200 Nickel-chromium	1.85
3300 Nickel-chromium	3.80
3400 Nickel-chromium	3.20
4100 Chromium-molybdenum (0.15 to 0.25 Molybdenum)	0.55
4100 Chromium-molybdenum (0.25 to 0.40 Molybdenum)	0.75
4340 Chr.-Ni.-Mo.	1.65
4345 Chro.-Ni.-Mo.	1.85
4600 Nickel - molybdenum (0.20 to 0.30 Mo. 1.50 to 2.00 Ni.)	1.10
5100 Chrome steel (0.60-0.90 Cr.)	0.35
5100 Chrome steel (0.80-1.10 Cr.)	0.45
5100 Chromium spring steel	0.15
6100 Chromium-vanadium bar	1.20
6100 Chromium-vanadium spring steel	0.85
Chromium-nickel vanadium	1.50
Carbon-vanadium	0.85

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. base per lb. Delivered Detroit, 3.45c., carlots

STAINLESS & HEAT RESISTANT ALLOYS

(Base prices, cents per lb. f.o.b. Pittsburgh)

Chrome-Nickel

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25c.	24c.
Plates	29c.	27c.
Structural shapes	25c.	24c.
Sheets	36c.	34c.
Hot-rolled strip	23.50c.	21.50c.
Cold-rolled strip	30c.	28c.
Drawn wire	25c.	24c.

Straight Chrome

	No. 410	No. 430	No. 442	No. 446
Bars	18.50c.	19c.	22.50c.	27.50c.
Plates	21.50c.	22c.	25.50c.	30.50c.
Sheets	26.50c.	29c.	32.50c.	36.50c.
Hot stp.	17c.	17.50c.	24c.	35c.
Cold stp.	22c.	22.50c.	32c.	52c.

TOOL STEEL

High speed	67c.
High-carbon-chrome	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c a lb. higher.

British and Continental

BRITISH

Per Gross Ton
f.o.b. United Kingdom Ports

Ferromanganese, export	Nominal
Tin plate, per base box	20s. 3d. to 21s.
Steel bars, open hearth	£10 8s.
Beams, open-hearth	£10
Channels, open hearth	£10 5s.
Angles, open-hearth	£10
Black sheets, No. 24 gage.	£13
Galvanized sheets, No. 24 gage	£15 15s.

CONTINENTAL

Per Gross Ton, Gold £, f.o.b. Continental Ports

Billets, Thomas	Nominal
Wire rods, No. 5 B.W.G.	£5 10s.
Steel bars, merchant	£5 6s.
Sheet Bars	Nominal
Plate ¼ in. and up	£5 7s.
Plate 3/16 in. and 5 mm.	£5 13s.
Sheet ⅛ in.	£5 9s. 6d.
Beams, Thomas	£4 18s.
Angles (Basic)	£4 18s.
Hoops and strip, base	£5 12s.

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.	$22.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	22.00
Delivered Brooklyn	24.50
Delivered Newark or Jersey City	23.53
Delivered Philadelphia	22.84
F.o.b. Neville Island, Erie, Pa. Toledo, Chicago, Granite City, Cleveland and Youngstown	21.00
F.o.b. Buffalo	21.00
F.o.b. Detroit	21.00
Southern, delivered Cincinnati	21.06
Northern, delivered, Cincinnati	21.44
F.o.b. Duluth	21.50
F.o.b. Provo, Utah	19.90
Delivered, San Francisco, Los Angeles or Seattle	24.50
F.o.b. Birmingham*	17.38

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 0.70 per cent and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same, except at Birmingham and Provo, which are not malleable iron basing points.

Basic

F.o.b. Everett, Mass.	$21.50
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	21.50
F.o.b. Buffalo	20.00
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown	20.50
Delivered Philadelphia	22.34
Delivered Canton, Ohio	21.89
Delivered Mansfield, Ohio	22.44
F.o.b. Birmingham	16.00

Bessemer

F.o.b. Buffalo	$22.00
F.o.b. Everett, Mass.	23.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	23.00
Delivered Newark or Jersey City	24.53
Erie, Pa., and Duluth	22.00
F.o.b. Neville Island, Toledo, Chicago and Youngstown	21.50
F.o.b. Birmingham	22.00
Delivered Cincinnati	22.11
Delivered Canton, Ohio	22.89
Delivered Mansfield, Ohio	23.44

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.	$26.50

Gray Forge

Valley or Pittsburgh furnace	$20.50

Charcoal

Lake Superior furnace	$25.00
Delivered Chicago	28.34

Canadian Pig Iron

	Per Gross Ton
Montreal	
Foundry iron	$24.50 base
Malleable	25.00 base
Basic	24.50 base
Toronto	
Foundry iron	$22.50 base
Malleable	23.00 base
Basic	22.50 base

On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload) $80.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	$28.00
Domestic, 26 to 28%	33.00

Electric Ferrosilicon

Per Gross Ton Delivered; Lump Size

50% (carload lots, bulk)	$69.50*
50% (ton lots in 50 gal. bbl.)	80.50*
75% (carload lots, bulk)	126.00*
75% (ton lots in 50 gal. bbl.)	139.00*

Bessemer Ferrosilicon

F.o.b. Furnace, Jackson, Ohio

Per Gross Ton

10.00 to 10.50% $30.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2%, $1 per ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 5.00 to 5.50% $24.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton. The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. **Base prices at Buffalo are $1.25 a ton higher** than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots, Lump Size, on Contract

4 to 6% carbon	10.50c.*
2% carbon	16.50c.*
1% carbon	17.50c.*
0.10% carbon	19.50c.*
0.06% carbon	20.00c.*

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon	$83.00
2.50% carbon	88.00
2% carbon	93.00
1% carbon	103.00

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads	$1.75
Ferrotungsten, 100 lbs. and less	2.00
Ferrovanadium, contract, per lb. contained V., delivered	$2.70 to $2.90†
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., ton lots	$2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton	$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	$157.50
Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton	$58.50
Ferronhosphorus, electrolytic, 23-26% in car lots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, $3 unitage, freight equalized with Nashville	$75.00
Ferromolybdenum, per lb. Mo. f.o.b. furnace	95c.
Calcium molybdate, per lb. Mo. f.o.b. furnace	80c.
Molybdenum oxide briquettes 48-52% Mo; per lb. contained Mo, f.o.b. Langeloth, Pa.	80c.

* Spot prices are $5 per ton higher.
† Spot prices are 10c. per lb. of contained element higher.

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, Bessemer, 51.50%...	$5.25
Old range, non-Bessemer, 51.50%	5.10
Messabi, Bessemer, 51.50%	5.10
Messabi, non-Bessemer, 51.50%	4.95
High phosphorus, 51.50%	4.85

Foreign Ore

C.i.f. Philadelphia or Baltimore

Per Unit

Iron, low phos., copper free, 55 to 58% dry, Alogeria	12c.
Iron, low phos., Swedish, average, 68½% iron	12c.
Iron, basic or foundry, Swedish, aver. 65% iron	11c.
Iron, basic or foundry, Russian, aver. 65% iron	Nominal
Man., Caucasian, washed 52%	29c.
Man., African, Indian, 44-48%	25c.
Man., African, Indian, 49-51%	28c.
Man., Brazilian, 46 to 48%	27c.

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered	$18.00
Tungsten, domestic, scheelite delivered	$15.00 to $16.00
Chrome or (lump) c.i.f. Atlantic Seaboard, per gross ton: South African (low grade)	$15.00
Rhodesian, 45%	19.00
Rhodesian, 48%	22.00
Turkish, 48-49%	22.50
Turkish, 45-56%	19.50
Turkish, 40-11%	17.00
Chrome concentrates (Turkish) c.i.f. Atlantic Seaboard, per gross ton: 50%	$24.00
48-49%	23.50

FLUORSPAR

Per Net Ton

Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	$17.00
Domestic, f.o.b. Ohio River landing barges	$18.00 to 19.00
No. 2 lump, 85-5, f.o.b. Kentucky and Ill. mines	18.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	21.50
Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	31.50

FUEL OIL

Per Gal.

No. 2, f.o.b. Bayonne	3.875c.
No. 6, f.o.b. Bayonne	2.50c.
No. 5 Bur. Stds., del'd Chicago	3.25c.
No. 6 Bur. Stds., del'd Chicago	2.75c.
No. 3 distillate, del'd Cleve'd.	5.50c.
No. 4 industrial, del'd Cleve'd.	5.25c.
No. 5 industrial, del'd Cleve'd.	3.75c.
No. 6 industrial, del'd Cleve'd.	3.50c.

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, Prompt	$3.75
Furnace, f.o.b. Connellsville, Prompt	$4.75 to 5.50
Foundry, by - product Chicago ovens	10.25
Foundry, by - product, del'd New England	12.50
Foundry, by - product, del'd Newark or Jersey City	10.88 to 11.40
Foundry, by - product, Philadelphia	10.95
Foundry, by - product, delivered Cleveland	10.30
Foundry, by - product, delivered Cincinnati	9.75
Foundry, Birmingham	7.50
Foundry, by - product, del'd St. Louis industrial district	10.75 to 11.00
Foundry, from Birmingham, f.o.b. cars dock Pacific ports	14.75

IRON AND STEEL WAREHOUSE PRICES

PITTSBURGH*

	Base per Lb.
Plates	3.40c.
Shapes	3.40c.
Soft steel bars and small shapes	3.35c.
Reinforcing steel bars	2.70c.
Cold finished bars and screw stock	3.65c.
Hot rolled strip	3.60c.
Hot rolled sheets	3.35c.
Galv. sheets (24 ga.) 500 lb. to 1499 lb.	4.50c.
Wire, black, soft annealed	3.15c.
Wire, galv., soft	3.55c.
Track spikes (1 to 24 kegs)	3.60c.
Wire nails (in 100-lb. kegs)	2.65c.

On plates, structurals, bars, strip and hot rolled sheets, base applied to orders of 400 to 1999 lb.
On reinforcing bars base applies to orders of less than one ton and includes switching and carting charge.
All above prices for delivery within the Pittsburgh switching district.

NEW YORK

	Base per Lb.
Plates, ¼ in. and heavier	3.76c.
Structural shapes	3.75c.
Soft steel bars, round	3.84c.
Iron bars, Swed. charcoal	7.50 to 8.25c.
Cold-fin. shafting and screw stock:	
Rounds, squares, hexagons	4.09c.
Flats up to 12 in. wide	4.09c.
Cold-rolled strip soft and quarter hard	3.51c.
Hot-rolled strip, soft O.H.	3.96c.
*Hot-rolled sheets (8-30 ga.)	3.40c.
Galv. sheets (24 ga.)	4.50c.
Long ternes (24 ga.)	5.50c.
Cold-rolled sheets (20 ga.)	
Standard quality	4.60c.
Deep drawing	4.85c.
Stretcher leveled	5.10c.
SAE, 2300, hot-rolled	7.35c.
SAE, 3100, hot-rolled	5.90c.
SAE, 6100, hot-rolled annealed	8.75c.
SAE, 2300, cold-rolled	8.59c.
SAE, 3100, cold-rolled, annealed	8.19c.
Floor plate, ¼ in. and heavier	5.56c.
Standard tool steel	12.50c.
Wire, black, annealed (No. 9)	4.35c.
Wire, galv. (No. 9)	4.70c.
Open-hearth spring steel	4.75c. to 10.25c.
Common wire nails, per keg in 25 keg lots	$2.90

*For lots less than 2000 lb.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.55c.
Soft steel bars, rounds and angles	3.50c.
Soft steel squares, hexagons, channels and Tees	3.65c.
Hot rolled strip	3.60c.
Floor plates	5.15c.
Hot rolled sheets	3.35c.
Galvanized sheets	4.25c.
Cold rolled sheets	4.30c.
Cold finished carbon bars	3.75c.

Above prices are subject to deductions and extras for quantity and are f.o.b. consumer's plant within Chicago free delivery zone.

CLEVELAND

	Base per Lb.
Plates	3.40c.
Structural shapes	3.58c.
Soft steel bars	3.25c.
Reinfor. bars (under 2000 lb.)†	2.55c.
Cold-fin. bars (1000 lb., over.)	3.75c.
Hot-rolled strip	3.50c.
Cold rolled sheets	4.55c.
Cold-finished strip	3.20c.
Galvanized sheets (No. 24)	4.62c.
Hot-rolled sheets	3.35c.
Floor plates, 3/16 in. and heavier	5.18c.
*Black ann'l'd wire, per 100 lb.	$3.10
*No. 9 galv. wire, per 100 lb.	3.50
*Com. wire nails, base per keg	2.60
Hot rolled alloy steel (3100)	5.85c.
Cold rolled alloy steel (3115)	6.75c.

* For 5000 lb. or less.
† 500 lb. base quantity.
Prices shown on hot rolled bars, strip, sheets, shapes and plates are for 400 to 1999 lb. Alloy steel, 1000 lb. and over; galvanized sheets, 150 to 1499 lb.; cold rolled sheets, 399 lb. and under.

ST. LOUIS

	Base per Lb.
Plates and structural shapes	3.47c.
Bars, soft steel (rounds and flats)	3.62c.
Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	3.77c.
Cold fin. rounds, shafting, screw stock	4.02c.
Galv. sheets (24 ga.)	4.53c.
Hot rolled sheets	3.38c.
Galv. corrugated sheets, 24 ga. and heavier*	4.58c.
Structural rivets	5.02c.

* No. 26 and lighter take special prices.

BOSTON

	Base per Lb.
Structural shapes, 3 in. and larger	3.85c.
Plates, ¼ in. and heavier	3.85c.
Bars	3.88c.
Heavy hot rolled sheets	3.71c.
Hot rolled sheets	4.21c.
Hot rolled annealed sheets	4.61c.
Galvanized sheets	4.61c.
Cold rolled sheets	4.71c.

The following quantity differentials apply: Less than 100 lb., plus $1.50 per 100 lb.; 100 to 399 lb. plus 50c.; 400 to 1999 lb. base; 2000 to 9999 lb. minus 20c.; 10,000 to 39,999 lb. minus 30c.; 40,000 lb. and over minus 40c.

BUFFALO

	Base per Lb.
Plates	3.62c.
Floor plates	5.25c.
Struc. shapes	3.40c.
Soft steel bars	3.35c.
Reinforcing bars (20,000 lb. or more)	2.05c.
Cold-fin. flats, squares, rounds, and hex.	3.65c.
Hot-rolled sheets, 3/16 x 14 in. to 48 in. wide incl., also sizes No. 8 to 30 ga.	3.35c.
Galv. sheets (24 ga.)	4.50c.
Bands and hoops	3.82c.

NEW ORLEANS

	Base per Lb.
Mild steel bars	4.20c.
Reinforcing bars	3.24c.
Structural shapes	4.10c.
Plates	4.10c.
Hot-rolled sheets, No. 10	4.35c.
Steel bands	4.75c.
Cold-finished steel bars	5.10c.
Structural rivets	4.85c.
Boiler rivets	4.85c.
Common wire nails, base per keg	3.55
Bolts and nuts, per cent off list	60

REFRACTORIES PRICES

Fire Clay Brick

	Per 1000 f.o.b. Works
Super-duty brick, at St. Louis	$60.80
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey	52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	42.75
Second quality, New Jersey	49.00
No. 1 Ohio	39.90
Ground fire clay, per ton	7.10

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$47.50
Chicago District	55.10
Birmingham	47.50
Silica cement per net ton (Eastern)	8.55

Chrome Brick

	Net per Ton
Standard f.o.b. Baltimore, Plymouth Meeting and Chester	$47.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	47.00

Magnesite Brick

	Net per Ton
Standard f.o.b. Baltimore and Chester	$67.00
Chemically bonded, f.o.b. Baltimore	57.00

Grain Magnesite

	Net per Ton
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	$45.00
Domestic, f.o.b. Baltimore and Chester in sacks	40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	3.40c.
*Structural shapes	3.40c.
*Soft steel bars, small shapes, iron bars (except bands)	3.60c.
‡Reinforc. steel bars, square and deformed	2.61c.
Cold-finished steel bars	4.06c.
*Steel hoops	4.10c.
*Steel bands, No. 12 and 3/16 in. incl.	3.60c.
*Spring steel	4.75c.
‡Hot-rolled anneal. sheets	3.40c.
†Galvanized sheets (No. 24)	4.28c.
*Diam. pat. floor plates, ¼ in.	5.00c.

These prices are for delivery in Philadelphia trucking area.
*For quantities between 400 and 1999 lb.
†For 10 bundles or over.
‡For one to five tons.

BIRMINGHAM

	Base per Lb.
Bars and bar shapes	3.50c.
Structural shapes and plates	3.55c.
Hot rolled sheets No. 10 ga.	3.35c.
Galvanized sheets No. 24 ga. or more	4.75c.
Strip	3.60c.
Reinforcing bars	3.50c.
Floor plates	5.88
Cold finished bars	4.43
Machine and carriage bolts	.50 & 10 off list
Rivets (structural)	$4.60 base

On plates, shapes, bars, hot-rolled strip heavy hot-rolled sheets, the base applies on 400 to 1999 lb. All prices are f.o.b. consumer plant.

PACIFIC COAST

	Base per Lb. San Francisco	Los Angeles	Seattle
Plates, tanks and U. M.	3.45c.	3.80c.	3.85c.
Shapes, standard	3.45c.	3.80c.	3.95c.
Soft steel bars	3.50c.	3.80c.	3.90c.
Reinforcing bars, f.o.b. cars dock Pacific ports	2.275c.	open	2.975c.
Hot-rolled sheets (No. 10)	3.45c.	4.00c.	3.70c.
Galv. sheets (No. 24 and lighter)	5.15c.	4.75c.	5.00c.
Galv. sheets (No. 22 and heavier)	5.40c.	4.75c.	5.00c.
Cold-finished steel Rounds	6.55c.	6.60c.	7.10c.
Squares and hexagons	7.80c.	7.85c.	7.10c.
Flats	8.30c.	8.35c.	8.10c.
Common wire nails—base per keg less carload	$3.00	$3.05	$3.00

All items subject to differentials for quantity.

ST. PAUL

	Base per Lb.
Mild steel bars, rounds	4.10c.
Structural shapes	4.00c.
Plates	4.00c.
Cold-finished bars	4.83c.
Hot-rolled annealed sheets, No. 24	4.75c.
Galvanized sheets, No. 24	5.00c.

On mild steel bars, shapes and plates the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000 lb. and over of a size.

DETROIT

	Base per Lb.
Soft steel bars	3.33c.
Structural shapes	3.65c.
Plates	3.60c.
Floor plates	5.27c.
Hot-rolled sheets, 8 to 30 gages above 12 in. and 3/16 in., 24 in. to 48 in. wide	3.43c.
Cold-rolled sheets	4.50c.
*Galvanized sheets	4.59c.
Hot-rolled strip, under No. 12	3.69c.
Hot-rolled strip, No. 12 and over	3.43c.
Cold-finished bars	3.80c.
Cold-rolled strip	3.55c.
Hot-rolled alloy steel (SAE 3100 Series)	5.97c.
Cold-rolled alloy (SAE 2300)	8.45c.

Quantity extras apply to all items.
*Price applies only in metropolitan Detroit.

FABRICATED STEEL

. . . Lettings decline to 7950 tons from 21,250 tons last week . . . New projects slightly higher at 9500 tons . . . Plate awards only 625 tons.

NORTH ATLANTIC STATES

AWARDS

1000 **Tons,** New Haven, Conn., Silliman College building for Yale University, to Ingalls Iron Works Co., Birmingham.

350 **Tons,** Quincy, Mass., Procter & Gamble Mfg. Co. plant, to new England Structural Co., Everett, Mass.

290 **Tons,** Philadelphia, addition to Scholler plant, to Bethlehem Steel Co., Bethlehem, Pa., through Erwin & Laden Co., Philadelphia.

250 **Tons,** Bridgeton, N. J., batch handling system for Owens-Illinois Glass Co., to Belmont Iron Works, Philadelphia.

190 **Tons,** Kings Park, Long Island, power plant for State Hospital, to Weatherly Steel Co., Weatherly, Pa.

155 **Tons,** Meadville, Pa., Montgomery Ward store, to Rogers Structural Steel Co., Corry, Pa.

140 **Tons,** Baltimore, warehouse, Johns Hopkins Hospital, to Maryland Steel Products Co., Baltimore.

SOUTH AND SOUTHWEST

320 **Tons,** Garvin County, Okla. bridge, to Capitol Steel & Iron Co., Oklahoma City.

255 **Tons,** McCurtain County, Okla., bridge, to J. B. Klein Iron & Foundry Co., Oklahoma City.

200 **Tons,** Corbin, Ky., power plant improvements, to L. Schreiber & Sons Co., Cincinnati.

165 **Tons,** Godwin, Tenn., transmission towers for TVA, to Lehigh Structural Steel Co., Allentown, Pa.

150 **Tons,** Oklahoma City, bridge, FAS-1702, to Capitol Steel & Iron Co., Oklahoma City.

140 **Tons,** Hiwasse, N. C., trash racks for TVA, to Ingalls Iron Works Co., Birmingham.

140 **Tons,** Alloy, W. Va., coke dock building for Electro Metallurgical Co., to Bethlehem Steel Co., Bethlehem, Pa.

CENTRAL STATES

800 **Tons,** Rock Falls, Ill., bridge, to Bethlehem Steel Co., Bethlehem, Pa.

660 **Tons,** Chicago, men's dormitory, Northwestern University, Chicago campus, to Bethlehem Steel Co., Bethlehem, Pa.

600 **Tons,** Cloquet, Minn., State viaduct, to Worden-Allen Co., Milwaukee.

500 **Tons,** Oakford, Ill., bridge, to Bethlehem Steel Co., Bethlehem, Pa.

265 **Tons,** Galt, Ill., State bridge, route FA-141, section 110-F-1, to American Bridge Co. Pittsburgh.

180 **Tons,** Milford, Ill., bridge section, to Milwaukee Bridge Co., Milwaukee.

165 **Tons** Peoria, Ill., research laboratory, Department of Agriculture, to Joseph T. Ryerson & Son, Inc., Chicago.

145 **Tons,** Cleveland, Woodhill Homes Housing project, to Paterson-Leitch Co., Cleveland.

130 **Tons,** Fessenden, N. D., State bridge, to Illinois Steel Bridge Co., Jacksonville, Ill.

120 **Tons,** Scott Field, Ill., completion, AC Hangar No. 1, to Columbia Iron Works, Columbia, Pa.

WESTERN STATES

260 **Tons,** San Francisco, Junior College gymnasium building, to Herrick Iron Works, Oakland, Cal., through Azevedo Construction Co., San Francisco.

240 **Tons,** Oakland, Cal., Earle Jorgenson warehouse, to Bethlehem Steel Co., San Francisco.

100 **Tons,** Vernon, Cal., American Can Co. addition, to Colombia Steel Co., San Francisco.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

9200 **Tons,** Woodbridge, N. J., superstructure, high-level bridge over Raritan River, route 35, section 14, Bethlehem Steel Co., Bethlehem, Pa., low bidder. (Previously reported.)

2500 **Tons,** New Ellenville, N. Y., contract No. 340, Lackawack Dam, Delaware Aqueduct.

859 **Tons,** Pike County, Pa., highway bridge.

750 **Tons,** Philadelphia, Tasker housing project; bids close July 14.

500 **Tons,** Erie County, Pa., highway bridge; bids due July 14.

440 **Tons,** Cumberland County, Pa., highway project; N. B. Putnam, Harrisburg, low bidder. (Previously reported.)

325 **Tons,** Pittsburgh, Terrace Village housing project for Pittsburgh Housing Authority.

200 **Tons,** Queens, N. Y., State bridge.

135 **Tons,** Rutland, Vt., grandstand for County Agricultural Society.

115 **Tons,** Dannemora, N. Y., building addition and power house for State.

THE SOUTH

900 **Tons,** Clarkeville, Tenn., building for B. F. Goodrich Co.

CENTRAL STATES

1950 **Tons,** Youngstown, Ohio, Cedar Street bridge; Hunter Construction Co., Youngstown, general contractor on low bid of $351,054.

700 **Tons,** Omaha, 10th Street viaduct; bids July 13.

600 **Tons,** Chicago, Ida B. Wells housing project for Negroes; bids July 25.

500 **Tons,** Dayton, Ohio, dynamometer laboratory building for Government.

250 **Tons,** Franklin County, Ohio, grade crossing elimination; B. F. Patterson, Columbus, Ohio, low bidder on general contract.

200 **Tons,** Rochester, Minn., Central High School addition.

125 **Tons,** Columbus, Ohio, paper mill for Ohio Wax Paper Co.

125 **Tons,** St. Louis, service and storage building for Greyhound Lines.

110 **Tons,** Pekin, Ill., addition, Standard Brands, Inc.; bids in.

WESTERN STATES

300 **Tons,** Los Angeles, tunnel ribs for Treasury Department.

208 **Tons,** Colton, Cal., bridge; bids July 27.

FABRICATED PLATES

AWARDS

625 **Tons,** Warren, Ohio, blast furnace alterations for Republic Steel Corp., to William B. Pollock Co., Youngstown (tonnage includes shapes).

PENDING PROJECTS

1200 **Tons,** Enumclaw, Wash., Mud Mountain Dam; bids August 8.

SHEET PILING

AWARDS

2070 **Tons,** Hartford, Conn., dike, to Carnegie-Illinois Steel Co., Pittsburgh.

1430 **Tons,** East Hartford, Conn., dike, to Bethlehem Steel Co., Bethlehem, Pa.

1100 **Tons,** State of Arkansas, White River levee, to Carnegie-Illinois Steel Co.

705 **Tons,** Springfield, Mass., dike, to unnamed bidder.

550 **Tons,** West Third Street bridge, to Bethlehem Steel Co., through Western Foundation Co., Chicago.

500 **Tons,** Chicago, Hoosier Terminal dock, to Carnegie-Illinois Steel Corp.

304 **Tons,** West Springfield, Mass., dike, to Inland Steel Co., Chicago.

150 **Tons,** Northampton, Mass., dike, to Bethlehem Steel Co., Bethlehem, Pa.

PENDING PROJECTS

1457 **Tons,** Holyoke, Mass., dike, previously reported 1700 tons.

400 **Tons,** Chicopee, Mass., dike.

New Coal Prices Seen Effective in 60 Days

PITTSBURGH — Although the Government has recently fixed coal prices or the various marketing districts throughout the country, public hearings are to be held before these quotations become effective. Operators in western Pennsylvania feel that it will be at least 60 days before the new coal prices will rule the market. Meanwhile, industrial coal quotations have sagged from 15c. to 20c. a ton in the past several weeks, and there is evidence that some industrial users are laying in stocks in anticipation of higher prices later. Under the law, however, coal orders must be shipped within 30 days after receipt of order. Hence this provision would, of course, prevent undue stocking of coal before the new prices go into effect.

On the average, coal prices today are about 50c. to 70c. a ton below the prices which have been set up by the Government and which are to take effect after public hearings have been held. As most dealers in western Pennsylvania are not in the practice of stocking up at this time, it is not expected that domestic coal sizes will be in great demand until just previous to the effective date for the fixed Government prices.

Incidentally, the coal prices for the various marketing areas, as fixed by the Government, have been fairly well received by producers in western Pennsylvania. It is expected that experiences under the new setup will be more satisfactory than conditions which existed under the previous price schedules which were eliminated because public hearings had not been held. Meanwhile, general demand for coal is expected to pick up from now on, reaching a peak within the next 60 days.

Navy Department Awards Contracts

WASHINGTON—The Navy Department's Bureau of Supplies and Accounts on Monday announced it had awarded a $28,928 contract to the Timken Roller Bearing Co., Canton, Ohio, for carbon steel tubing; a $11,252 contract to the Warner & Swasey Co., Cleveland, for turret lathes; a $12,369 contract to the Springfield (Ohio) Machine Tool Co., for engine lathes; a $13,575 contract to the Gisholt Machine Co., of Madison, Wis., for a turret lathe; and a $9,374 contract to the Standard Transformer Co., of Warren, Ohio, for one transformer.

. . . NON-FERROUS . . .

. . . Splurge in copper over week end nets sales of 89,260 tons; prices raised ¼c. . . . Lead and high grade zinc sales also gain in sympathy with bullish copper sentiment.

NEW YORK, July 11—Another of the sporadic buying waves which are so characteristic of the copper market, got under way last Friday and over the week end more than 89,000 tons of copper was sold. On Friday, when sales totaled over 85,709 tons, prices were advanced ¼c. to 10.25c. per lb., delivered, Connecticut Valley, in two moves; ⅛c. in the morning and a similar amount late the same afternoon. Although coverage at the 10c. level was undoubtedly extended to a large degree on Friday, it appears that the bulk of the week end business was done at 10.125c. per lb. The buying had no relationship to developments in the copper consuming industry, for, while there has been some gradual improvement there, there was nothing that of itself would justify the heavy buying of the last week. The purchases of the past five days, added to material already on hand, will unquestionably provide coverage well through the fourth quarter at the present rate of consumption. The foreign market has been moderately active all week, with prices that advanced to as high as 10.40c. per lb., c.i.f., usual base ports, late last week. This morning's business was done in the neighborhood of 10.35c. per lb.

Lead

Despite three previous weeks of very heavy covering, buyers in the past week continued to take in lead supplies very freely. During the early part of the week demand was rather quiet, but, coinciding with the spurt in copper, lead buying picked up on Friday and yesterday and today sellers were forced to go deeply into reserves to accommodate the demand. August material accounted for about 80 per cent of the week's business, with that month about ⅓ covered. July is close to 85 per cent specified. Prices here are unchanged at 4.85c. per lb., New York, but the market is following the London price very closely as it slowly works higher.

Tin

In contrast to the activity in copper and lead, business in the tin market was practically at a standstill all during the holiday week. Prices moved down slightly during the period, chiefly due to efforts to move a few small lots of spot metal. Today's quotation on prompt Straits is 48.50c. per lb., New York, 30 points below last Wednesday. The London market has been similarly dull, with the spot price hovering around the buffer pool limits.

Zinc

Although prime Western sales in the holiday week were rather low, amounting to 2960 tons, brass makers were very active in buying the higher grades, apparently in an effort to match their copper commitments. The bulk of the past week's prime Western turnover was in July positions.

Brazing Alloys Reduced

Owing to the recent reductions in the price of silver, Handy & Harman, New York, have reduced the price of their brazing alloys. Sil-Fos alloy is down 20c. per lb. and Easy-Flo is 3½c. per troy ounce lower.

June Average Prices

The average prices of the major non-ferrous metals in June, based on quotations appearing in THE IRON AGE, were as follows:

	Per lb.
Electrolytic copper, Conn. Valley	10.00c.
Lake copper, Eastern delivery	10.00c.
Straits tin, spot, New York	48.81c.
Zinc, East St. Louis	4.50c.
Zinc, New York	4.89c.
Lead, St. Louis	4.65c.
Lead, New York	4.80c.

NON-FERROUS PRICES

Cents per lb. for early delivery

	July 5	July 6	July 7	July 8	July 10	July 11
Copper, Electrolytic[1]	10.00	10.00	10.25	10.25	10.25	10.25
Copper, Lake	10.00	10.00	10.00	10.00	10.00	10.00
Tin, Straits, New York	48.65	48.65	48.60	....	48.50	48.50
Zinc, East St. Louis[2]	4.50	4.50	4.50	4.50	4.50	4.50
Lead, St. Louis[3]	4.70	4.70	4.70	4.70	4.70	4.70

[1] Delivered Conn. Valley. Deduct ¼c. for New York delivery. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

Warehouse Prices

Cents per lb., Delivered

	New York	Cleveland
Tin, Straits pig	49.50c.	52.00c.
Copper, Lake	11.50c.	11.375c.
Copper, electro	11.375c.	11.375c.
Copper, Castings	11.00c.	11.125c.
*Copper sheets, hot-rolled	18.37c.	18.37c.
*High brass sheets	16.65c.	16.65c.
*Seamless brass tubes	19.40c.	19.40c.
*Seamless copper tubes	18.87c.	18.87c.
*Brass rods	12.00c.	12.00c.
Zinc slabs	6.15c.	6.90c.
Zinc sheets, No. 9 casks	10.50c.	12.10c.
Lead, American pig	5.85c.	5.70c.
Lead, bar	6.45c.	8.25c.
Lead, sheets, cut	8.00c.	8.00c.
Antimony, Asiatic	15.00c.	17.00c.
Alum, virgin, 99 per cent plus	22.50c.	22.50c.
Alum., No. 1 remelt., 98 to 99 per cent	19.50c.	19.50c.
Solder, ½ and ½	29.25c.	29.75c.
Babbitt metal, commercial grade	21.50c.	21.75c.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33 1/3; on brass sheets and rods, 40, and on brass and copper tubes, 25.

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	8.00c.	9.625c.
Copper, hvy. and wire	7.00c.	7.375c.
Copper, light and bottoms	6.125c.	6.375c.
Brass, heavy	4.25c	4.75c.
Brass, light	3.375c.	4.125c.
Hvy. machine composition	6.125c.	7.325c.
No. 1 yel. brass turnings	4.00c.	4.50c.
No. 1 red brass or compos. turnings	6.00c.	6.50c.
Lead, heavy	3.875c.	4.75c.
Cast aluminum	6.50c.	7.75c.
Sheet aluminum	12.25c.	13.75c.
Zinc	2.125c.	3.375c.

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered; virgin, 99 per cent plus, 20c.-21c. a lb.; No. 12 remelt No. 2 standard, 19c.-19.50c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt, New York; Asiatic, 14c. a lb., f.o.b.; American, 12c. a lb. QUICKSILVER, $90-$92 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 10.50c. a lb.

PLANT EXPANSION AND EQUIPMENT BUYING

NORTH ATLANTIC

National Gypsum Co., 190 Delaware Avenue, Buffalo, building products, plans expansion and improvements in branch mill at East 148th to 150th Street and East River, New York, including several one-story buildings and new equipment. Cost over $500,000 with machinery.

Mack International Motor Truck Corp., Thirty-fourth Street and Forty-eighth Avenue, Long Island City, New York, has leased one-story building, 30 x 100 ft., at 730 Peachtree Street, N.E., Atlanta, Ga., and will remodel for factory branch, storage and distributing plant. Hentz, Adler & Shutze, Candler Building, Atlanta, are architects.

Commanding Officer, Ordnance Department, Watervliet Arsenal, Watervliet, N. Y., asks bids until July 28 for one combination contour metal sawing, filing and polishing machine (Circular 302).

Templar Oil Products Co., 345 West Broadway, New York, manufacturer of special cements, oils, etc., has purchased two-story and basement building, 83 x 100 ft., on Fifty-first Street, near First Avenue, Brooklyn, for plant.

Saratoga Vichy Springs Co., Hamilton Street, Saratoga Springs, N. Y., plans new one-story mechanical-bottling plant. Cost close to $50,000 with equipment. Melvin L. and Harry A. King, Denison Building, Syracuse, N. Y., are architects.

United States Steel Corp., 71 Broadway, New York, plans new one-story mill for zinc production at Gouverneur, N. Y. Cost close to $50,000 with equipment.

Board of Water Supply, 346 Broadway, New York, Richard H. Burke, Jr., secretary, asks bids until July 18 for 11 48-in. and four 72-in. bronze riser valves, five 8-ft. x 9 ft. bronze multiple flap valves, bronze riser valve operating rods, and bronze and brass pipe for Delaware Aqueduct (Contract 346).

National Oil Products Co., Essex Street, Harrison, N. J., industrial chemicals, processed oil products, etc., plans five-story addition on adjoining site. Cost about $175,000 with equipment.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until July 17 for six sets of geometric chasers, hand and machine taps (Circular 1025), reworking approximately 160,000 lb. of miscellaneous metals (Circular 966), one set of forged steel cheek blocks (clamp rings), (Circular 1014); until July 21, 44,400 ft. of steel wire and 250,000 ft. of low brass wire (Circular 1027); until July 24, 54,300 galvanized or copper-coated steel staples (Circular 1001), 5000 spot welded, steel fabricated metal packing crates for demolition bombs (Circular 994).

American Coil Spring Co., Newark, N. J., has leased space in building at 25-27 Lexington Avenue for manufacture of steel springs for automatic refrigerators and other service.

Frederick A. Brodesser, State purchasing commissioner, State House, Trenton, N. J., asks bids until July 17 for gasoline engine-driven air compressor, straight line, single stage, double-acting air compressor, hoists and bodies, power squaring shear with 15-in. gap and 72-in. cut, power sprayers, power apron brake, paving breakers, jackhammers, etc.; until July 21, one heavy-duty machinery trailer.

Hatfield Wire & Cable Co., Hillside Avenue, Hillside, N. J., insulated wire and cable, has let general contract to Michael Stefany, 246 Fabyan Place, Newark, N. J., for one-story addition. Cost close to $40,000 with equipment.

Commanding Officer, Ordnance Department, Frankford Arsenal, Philadelphia, asks bids until July 25 for one motor-driven milling machine (Circular 1441).

Lancaster Malleable Castings Co., Manheim Pike, Lancaster, Pa., plans rebuilding part of plant recently destroyed by fire. Loss about $50,000 with equipment.

Bureau of Yards and Docks, Navy Department, Washington, plans group of buildings at Marine Corps depot for storage and distribution. Appropriation of $1,300,000 has been authorized for structures and equipment.

BUFFALO DISTRICT

Jamestown Metal Equipment Co., Allen Street Extension, Jamestown, N. Y., plans large addition for its Blackstone washing machine division, with increased facilities for parts producton and assembling. Cost over $300,000 with equipment. Company has work under way on two-story extension, 55 x 104 ft., for expansion in automobile radiator and allied metal products division, to cost over $60,000 with machinery.

Crucible Steel Co. of America, Inc., 405 Lexington Avenue, New York, has begun expansion and improvements in branch mills at Syracuse, N. Y., including plants of Halcomb Steel Co. and Sanderson Brothers Steel Co. Work will include new buildings, modernization of present structures and additional equipment. Cost close to $900,000 with machinery.

NEW ENGLAND

Commanding Officer, Ordnance Department, Watertown Arsenal, Watertown, Mass., asks bids until July 17 for two spindle drilling and reaming machines (Circular 782).

Greenfield Tap & Die Corp., Greenfield, Mass., plans one-story addition. Cost close to $50,000 with equipment.

Board of Selectmen, Watertown, Mass., has authorized fund of $75,000, with like amount to be secured through Federal aid, making total appropriation of $150,000, for one-story municipal service, repair and garage building on Whitney Hill for town-owned motor trucks and cars. Bids will be asked soon on general contract.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 18 for indicating equipment for propeller shaft revolutions (Schedule 6723) for Boston and Charleston Navy yards; air-pressure reducing valves and spare parts (Schedule 6685); until July 25, brass pipe and copper tubing (Schedule 6740) for Portsmouth, N. H., and Mare Island yards.

Colonial Beacon Oil Co., 378 Stuart Street, Boston, has plans for new bulk oil storage and distributing plant at Barre, Vt., with steel tank storage, pumping station and other facilities. Cost close to $60,000 with equipment.

WASHINGTON DIST.

Chemical Warfare Service, Edgewood Arsenal, Edgewood, Md., asks bids until July 18 for three chain hoists, trolleys, machine bolts, nails, wood screws and other equipment (Circular 521).

Sylvania Industrial Corp., Fredericksburg, Va., manufacturer of cellulose transparent paper, has let general contract to Hughes-Foulkrod Co., Schaff Building, Philadelphia, for one-story addition for storage and distribution. Cost over $50,000 with equipment. Executive offices are at 122 East Forty-second Street, New York.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until July 19 for turbine-driven a.c. and d.c. electric generators, alternator air coolers, condensers, air ejectors, condensate pumps and auxiliary equipment for power plants at Norfolk Navy Yard; Portsmouth, N. H., yard; Naval Academy, Annapolis, Md., and naval air station, Pensacola, Fla. (Specifications 9290); also bids (no closing date stated) for power plant at navy yard, Pearl Harbor, T. H. (Specifications 9124).

General Purchasing Officer, Panama Canal, Washington, asks bids until July 17 for one motor-driven, stationary-type, nibbling metal-working machine and four pneumatic wrenches (Schedule 3508); until July 18, 50 cast iron bases for street-light posts, 65,000 ft. of rigid steel conduit, 300 conduit couplings, 500 conduit elbows, 50,000 ft. of rubber-insulated cable, 25,000 ft. of rubber-insulated copper wire, 10,000 ft. of copper cable, 65,000 ft. of rubber-insulated fixture wire, magnet wire, flexible copper cord, copper stove wire, toggle switches, pipe sleeving and other equipment (Schedule 3503).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 18 for 78 29-ft. long chains without flights, and 52 sets of socket carrier links (Schedule 6719) for Washington yard; motor-driven lathes (Schedule 6552); until July 21, electric arc furnaces (Schedule 6561), motor-driven turret lathes (Schedule 6559) for Eastern and Western yards.

SOUTH ATLANTIC

City Council, Abbeville, S. C., has recently rejected bids received for construction of municipal hydroelectric generating plant and will take new bids closing July 18, including power dam, power station, penstocks, spillway and other structures. Cost about $435,000. Financing has been arranged through Federal aid. Wiedeman & Singleton, Candler Building, Atlanta, Ga., are consulting engineers.

National Fruit Products Co., 725 Humphries Street, S.W., Atlanta, Ga., has let general contract to Industrial Constructors Co., Broad Street and Allegheny Avenue, Philadelphia, for one-story distillery, 80 x 125 ft. Cost over $50,000 with equipment.

SOUTH CENTRAL

Pan-American Shell Corp., 26 Exchange Place, Jersey City, N. J., oil products, including carbon distillates and other by-products, has leased building, about 25,000 sq. ft. of floor space, and adjoining property at Mobile, Ala., held by Alabama State Docks Commission, and will improve for new branch refining and processing plant. Cost about $50,000 with equipment.

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until July 19 for six 6-cu. yd. dump trucks for Watts Bar dam project, rated gross capacity not less than 36,000 lb.

Billups Petroleum Co. of Tennessee, Inc., Memphis, Tenn., has asked bids on general contract for new bulk storage and distributing plant at Bellevue Avenue and Belt Line Railway, with main two-story building and smaller structures, steel tank storage units, pumping station and other facilities. Cost close to $60,000 with equipment. Estes W. Mann, Shrine Building, is architect.

Louisiana State Rice Milling Co., Lake Charles, La., will take bids soon on general contract for one-story addition for storage and distribution, also improvements in present mill. Cost over $45,000 with equipment.

WESTERN PA. DIST.

Electro Metallurgical Co., 30 East Forty-second Street, New York, plans new unloading dock for coke shipments at Branch plant, Alloy, W. Va., on Kanawha River, including mechanical-handling facilities.

United States Engineer Officer, New Post-office Building, Pittsburgh, asks bids until July 11 for all motors and controls, and capstan parts required for lock No. 9, Allegheny River (Circular 1).

Hygrade Sylvania Corp., Emporium, Pa., electric lamps, radio tubes and allied equipment, has work under way on three additions for expansion in radio and lighting tube di-

visions. General contract has been let to Leslie R. Porter Co., 164 Stuart Street, Boston. Cost about $200,000 with equipment. Main offices are at Salem, Mass.

SOUTHWEST

Monsanto Chemical Co., 1700 South Second Street, St. Louis, has let general contract to Fruin-Colnon Contracting Co., Merchants Laclede Building, for one-story addition, 60 x 130 ft., with lean-to extension, 28 x 30 ft., to be used as a machine shop. Cost over $50,000 with equipment.

John Morrell & Co., foot of Quincy Street, Topeka, Kan., meat packers, plan addition to local plant, six stories, 100 x 150 ft., for which bids will be asked soon on general contract. Cost over $125,000 with equipment. Main offices are at Ottumwa, Iowa.

Ritepoint Co., 4141 Minnesota Street, St. Louis, metal pencils, pens and allied products, will ask bids soon on general contract for new one-story and basement plant, 60 x 110 ft., with extension, 24 x 30 ft., on Broadway, near Winnebago Street. Cost close to $50,000 with equipment. A. F. and Arthur Stauder, 6921-A Gravois Avenue, are architects.

St. Louis-Southwestern Railway Co., 408 Pine Street, St. Louis, has let contract to Wisconsin Bridge & Iron Co., Milwaukee, for addition to machine shop at car and locomotive works, Pine Bluff, Ark. Foundations and miscellaneous construction will be carried out by company forces. Cost close to $80,000 with equipment.

Midland & Condor Petroleum Co., Abilene, Tex., plans new gas recycling plant for gasoline production in gas field at Grapeland, Houston County, Tex., comprising several operating units for processing, storage and distribution. Cost over $75,000 with equipment.

Huber-Montana Co., Borger, Tex., recently organized as an interest of J. M. Huber, Inc., Borger, manufacturer of carbon black, printing inks, etc., plans new works for production of carbon black at Cut Bank, Mont., where tract has been acquired. It will comprise three main units for absorption plant to remove butane and natural gas, extraction plant for carbon black, and chemical division for classifying and preparing for market; also a compressor station and other structures, including storage and distributing buildings. Cost close to $500,000 with equipment.

OHIO AND INDIANA

Emery Machine Co., 218 East North Street, Akron, Ohio, machinery and parts, will take bids on general contract early in August for one-story machine shop at Cuyahoga Falls, Ohio. Cost close to $40,000 with equipment. Melville C. Peck, 2638 Albrecht Avenue, Ellet, Ohio, is architect.

Ohio Farm Bureau Federation, 630 East Broad Street, Columbus, Ohio, plans new commercial fertilizer-manufacturing plant at Cincinnati, and will ask bids on general contract before end of July. Plant will be of dry-mixing type and will include storage and distributing buildings, and power house. Cost about $200,000 with equipment.

Construction Service, Veterans' Administration, Washington, asks bids until July 25 for boiler units and accessories, and other boiler plant equipment for power house at institution at Dayton, Ohio.

Standard Oil Co. of Ohio, Midland Building, Cleveland, has approved plans for expansion in oil refinery on Cedar Point Road, Toledo, Ohio, with equipment for expansion in gasoline output. Cost close to $100,000 with machinery. Company has let general contract to Paugh & Brown, Inc., 6007 Euclid Avenue, Cleveland, for new bulk oil storage and distributing plant on 14-acre tract at Cincinnati, comprising main one-story building, 120 x 300 ft., one-story office and operating building, 41 x 115 ft., steel tanks, pumping station and auxiliary structures. Cost close to $200,000 with equipment.

Doehler Die Casting Co., 2100 Smead Avenue, Toledo, Ohio, plans rebuilding part of plant recently damaged by fire, caused by an explosion. Loss close to $40,000 with equipment.

Link-Belt Co., 220 South Belmont Street, Indianapolis, has begun superstructure for one-story addition to Ewart Works, 280 x 600 ft., for which general contract recently was let to Carl M. Geupel Construction Co., Hume-Mansur Building. Cost over $500,000 with equipment. D. A. Bohlen & Son, Majestic Building, are architects.

Board of Public Works, Columbia City, Ind., plans expansion and improvements in municipal electric power plant, including new 2500-kw. turbine-generator unit and accessory equipment. Cost about $120,000.

MICHIGAN DISTRICT

Wheel Trueing Tool Co., 13931 Oakland Street, Detroit, automobile tools and equipment, has asked bids on general contract for new plant at Davison and Wildemere Avenues, consisting of a main one-story structure for parts production and assembling, and one-story office adjoining. Cost over $60,000 with equipment. Frank Eurich, Jr., Inc., Detroit Savings Bank Building, is architect.

Michigan Sugar Co., Saginaw, Mich., plans expansion and improvements in branch beet sugar mill at Croswell, Mich., including equipment. Power house will be extended and two new 600-hp. boiler units, turbine-generator and auxiliary equipment installed. Cost about $150,000 with machinery.

Air Control Products, Inc., Muskegon, Mich., organized a few months ago to manufacture registers, grilles and other equipment for heating and air-conditioning systems, and now occupying space in Browne-Morse Building, Muskegon Heights, has acquired a one-story building and adjoining property at Muskegon for permanent plant, expanding present capacity. Robert L. Leigh is president.

MIDDLE WEST

Thompson Wire Co., Edington and King Streets, Franklin Park, Ill., manufacturer of wire goods, has let general contract to Austin Co., 16112 Euclid Avenue, Cleveland, and 510 South Dearborn Street, Chicago, for one-story addition, 40 x 120 ft. Cost close to $50,000 with equipment.

Commanding Officer, Ordnance Department, Rock Island Arsenal, Rock Island, Ill., asks bids until July 17 for one set of roughing broaches (Circular 876), steel wire (Circular 875).

John Deere Tractor Co., Waterloo, Iowa, agricultural equipment, has let general contract to Jean Olesen & Sons Construction Co., Waterloo, for three additional stories to present three-story plant building. Cost close to $75,000 with equipment.

Board of Public Works, Fremont, Neb., has rejected bids recently received for expansion and improvements in municipal electric power plant and will ask new bids soon. Cost about $280,000 with equipment. Black & Veatch, 4706 Broadway, Kansas City, Mo., are consulting engineers.

Carney Rock Wool Co., Mankato, Minn., recently organized by officials of Carney Cement Co., same place, as a subsidiary, plans early construction of one-story mill for production of rock wool insulation specialties, near cement mill of parent company. Cost close to $50,000 with machinery. H. E. Carney, Jr., is president of both companies.

Green Bay Coca-Cola Bottling Co., Green Bay, Wis., plans new one-story mechanical-bottling plant, with storage and distributing facilities, on South Broadway. Cost about $40,000 with equipment. Service and garage unit for company motor trucks and cars also will be built. George Schley & Sons, 735 North Water Street, Milwaukee, are architects.

Soy Bean Processing Co., Waterloo, Iowa, plans power house at mill, with installation of boiler unit and accessories, stoker and other equipment. Bids are being asked on general contract. Cost close to $40,000 with equipment. Helmick, Edeskuty & Lutz, Essex Building, Minneapolis, Minn., are consulting engineers.

Lincoln Service Corp., Kemmerer, Wyo., plans extensions and improvements in local steam-electric generating plant, including new generator unit, condenser and auxiliary equipment. Cost about $125,000.

PACIFIC COAST

Schumacher Wall Board Corp., 5721 South San Pedro Street, Los Angeles, plans new work on 12-acre tract at South Gate, near Los Angeles, recently acquired. Initial unit will be one-story, totaling about 10,000 sq. ft. of floor space, for which bids will be asked soon on general contract. Closely following, bids will be called for other structures, including two one-story manufacturing units, machine shop, service and garage building, power house and miscellaneous buildings. Cost close to $1,000,000 with equipment. Leland S. Rosener, 233 Sansome Street, San Francisco, is engineer.

Bureau of Reclamation, Denver, asks bids until Aug. 1 for pipe, fittings, valves, and accessories for emergency-gate air inlets and drum gate control at Grand Coulee power dam, Grand Coulee, Columbia Basin project, Wash. (Specifications 866).

Broderick & Bascom Rope Co., 4203 North Union Street, St. Louis, wire rope, cable, etc., has let general contract to General Construction Co., 3840 Iowa Street, Seattle, for new one-story factory branch, storage and distributing plant at Maynard Avenue and Edmunds Street, Seattle, 70 x 220 ft. Cost over $65,000 with equipment. W. J. Knight & Co., Wainwright Building, St. Louis, are consulting engineers.

Imperial Irrigation District, El Centro, Cal., asks bids until July 18 for hydroelectric power plant on All-American Canal at Drop No. 4, including radial gates with hoist equipment, bulkhead gates, tanks and miscellaneous pumps and motor equipment; cables; 50-ton traveling crane and bulkhead gate crane; turbine governor, generating unit and auxiliary equipment.

Val-Vita Packing Co., 1003 Santa Fe Avenue, Los Angeles, Cal., has low bid from Lynch Construction Co., 730 East Gage Avenue, for one-story food products packing, storage and distributing plant, 200 x 535 ft., at Fullerton, Cal. An office and operating building, 50 x 120 ft., will be erected on adjoining site. Cost close to $90,000 with equipment. Douglas McLellan, Architects' Building, Los Angeles, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 21 for one universal horizontal milling machine, with motor controller; set of equipment, set of tools and wrenches (Schedule 6699), motor-driven vertical boring mill and equipment (Schedule 6694), motor-driven universal grinder, spare parts, tools and wrenches (Schedule 6706) for Mare Island Navy Yard.

FOREIGN

Australian Aluminum Co., Pty., Ltd., Sydney, New South Wales, Australia, recently organized as an interest of British Aluminum Co., Ltd., Adelaide House, King William Street, London, England, and Aluminum Co. of Canada, Ltd., Sterling Road, Toronto, Ont., is securing site near Sydney for new plant, to consist of several one and multi-story units, with power house and other mechanical departments. Cost about $1,500,000 with equipment. New company will operate with a capital of $5,000,000.

Correa & Castro, Ltd., Rio de Janeiro, Brazil, is interested in a project to build an oil refinery near Rio de Janeiro, in which Government of Brazil will be active and assist in financing. Plant will comprise large production units, with power house, pumping station, steel tank storage department and other facilities. It will have initial rating of about 10,000 bbl. of crude oil per day, which will be secured from Mexico, under contract with Mexican Government. Majority of equipment will be secured in United States. Cost estimated over $3,000,000. Another oil refinery will be built later at Sao Paulo, Brazil, to handle about 7000 bbl. of Mexican crude oil daily. First mentioned refinery is scheduled for completion early in 1940.

THIS WEEK'S MACHINE . . . TOOL ACTIVITIES . . .

. . . Some slackening in sales this month, possibly due to seasonal factors.

Domestic Tool Demand At Cincinnati Is Lower

CINCINNATI—Machine tool demand in this area eased during the past week to a level just a trifle under the average for June. Whether this slight decline is the result of the holiday period or a reaction to normal seasonal influences is difficult to determine at this time, but the opinion in the market is inclined toward the holiday reason. Manufacturers generally report that foreign demand has been holding up in pretty good shape, but that a lower domestic demand has been noted.

While deliveries on standard types of tools are better than on specialties, there has been little change in the shipping situation in the last week. On some types of tools delay runs only a few weeks, while on others reports indicate that shipments are a month up to two months behind instructions. Factory operations are averaging somewhere between 60 and 70 per cent; plants which have the heaviest volume of orders are running night shifts through five days of the week. One or two plants closed down for the entire week for vacation period, but most of them closed only for the single holiday.

July to Be Fair Month For Chicago Tool Dealers

CHICAGO—For most Chicago machinery sellers June showed a slight improvement over May. In some cases only unit volume was up while dollar sales were less than the previous month but in other instances both unit and dollar volume was improved. Small tool sales for the June period were slightly less than in May but this was attributed solely to the usual summer slackening and was not considered an indication of poorer business, barring seasonal factors. The International Harvester Co. and the arsenal at Rock Island are the only two important buyers in this district at present. With practically no exceptions other machine tool orders are being received in lots of one or two.

July probably will be a fairly good month because of buying from the above two sources. The Harvester company has introduced its new small tractor to compete with the Ford tractor and at the moment is working on a tool program for its track-type tractor.

Strike Halts Installation Of Tools in G-M Plants

DETROIT—Attempts to install new machinery and tools, dies, jigs and fixtures in General Motors plants have been halted because of the UAW-CIO strike among skilled workers. At St. Louis, Mich., the Alma Motors Co. is preparing a plant for the manufacture of axles and transmission units for light trucks. It is reported that the plant is already fairly well equipped but that more equipment probably will be purchased after production gets underway later in the summer.

Business at Cleveland Better than Expected

CLEVELAND—Activity since the start of July has exceeded expectations here. Little had been anticipated because of seasonal slackness and vacation shutdowns. Orders are principally for single machines and well diversified as to industries.

An automobile manufacturer this week ordered four more radial drills to accompany the eight placed 10 days earlier. Another Michigan company purchased several tools. The new Kodak plant in western New York state has been one of the heaviest buyers during recent months. Government purchases for arsenals and Navy shops have been well maintained.

Depending upon the type of machine tool and the condition of the producer's order backlog, deliveries on lathes range from four to seven weeks; on horizontal boring mills, four to five months; on large milling planers, eight to ten months and on vertical boring mills four to six months.

Sales Negligible During Holiday Week in the East

NEW YORK—Most machine tool sellers in the metropolitan district took a long weekend over the Fourth and when they returned to their desks on Wednesday found business dull. The short week was almost entirely unproductive of orders, but it is hardly a true indication of the market. Absence of production executives on vacation during the summer months is likely to slow up purchasing and prolong decisions, but the past week is hardly a good test of this seasonal factor. There are plenty of active quotations out, but the trade is not willing to venture a guess as to the immediate future. June was a fair month, helped by orders from rifle makers in Connecticut.

The Russians are making inquiry for large and heavy equipment once more, following several months of slackness in buying. French purchases of machine tools have been heavy in the past month.

. . . GREAT BRITAIN . . .

. . . South Africa buys 66,000 tons of rails from British and Canadian mills

LONDON, July 11 (*By Cable*)—South African Railways and Harbors Administration has bought 66,000 tons of British rails valued at £601,000. Nine mills in the United Kingdom will supply 37,000 tons and Canadian mills will supply 29,000 tons. The rails will be shipped in British boats.

The international situation and holiday influences are jeopardizing Continental steel activity in new business, but works are well placed.

Steel activity in Great Britain is being maintained and intense efforts are being made to increase ingot output. New commercial demand has tapered off as the holiday season approaches, but works are heavily sold. Sheet rollers and small structural steel makers are giving priority to air raid defense orders so that new commercial business is virtually impossible unless for far forward delivery. Shipbuilding specifications are increasing steadily. In some cases, owing to steel shortage, certain consumers are using wrought iron.

There is strong home demand for tin plate for prompt early delivery following government advice to householders to lay up food stores. Export business is moderate. Export prices are still over the minimum schedule but a trifle easier.

. . . CANADA . . .

. . . Seasonal quiet prevails . . . Export business good.

TORONTO, July 11—The holiday season is taking toll from the Canadian steel markets. The automotive industry is switching over to 1940 models, which also is a factor that tends to reduce business in steel.

Official announcement has been made that work will be started this month on the new Bank of Montreal building at Toronto, for which some 3000 tons of structural steel will be required. Several other projects will result in good purchases of structural and reinforcing bars in the early future.

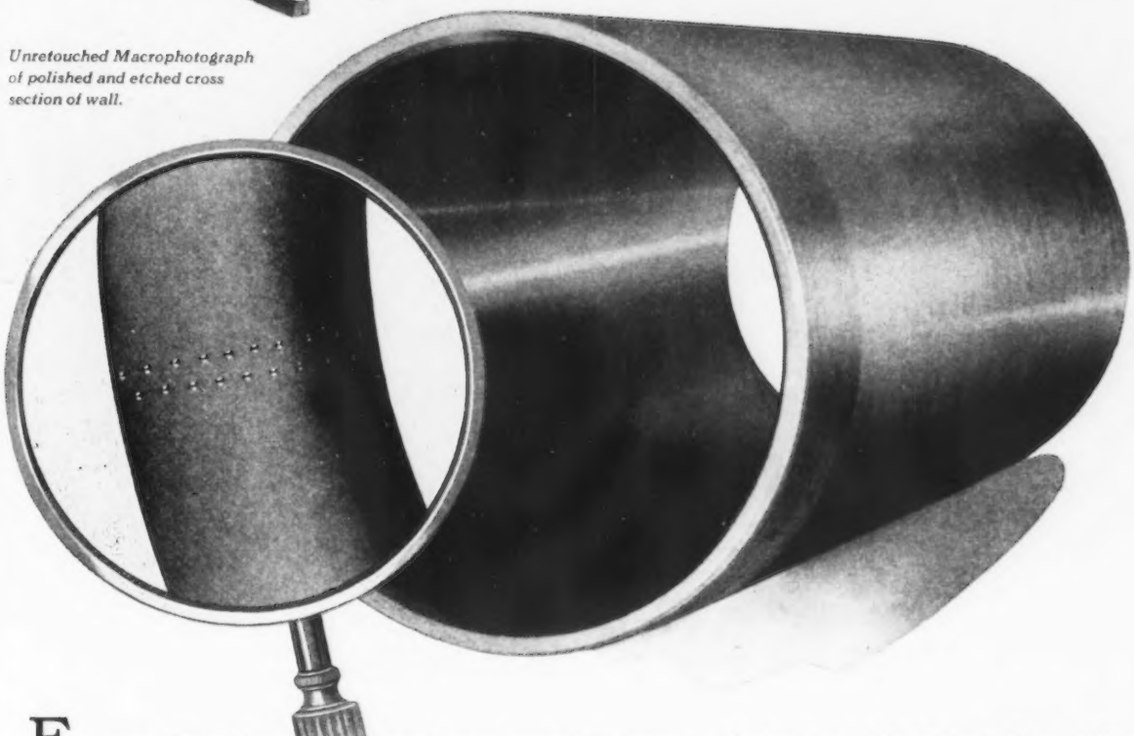
Export demand for iron and steel continues in good volume, and large shipments are being made regularly to Great Britain.

HARRISBURG

Announces the Nelson-izing Process

a great forward step in the making of Heavy Duty

PUMP LINERS



Unretouched Macrophotograph of polished and etched cross section of wall.

Rockwell "C" Rating	*Equivalent in Brinell Number*
24	248
24	248
24	248
24	248
25	253
25	253
25	253
25	253
31	293
34	321
36	341
38	363
41	388
48	464
51	500
57	578
58	601
60	627
60	627

For years, Harrisburg drop-forged seamless steel pump liners have set the standard for accuracy in diameters and threading, for smooth finish and dependability in service. Now the new and exclusive *Nelson-izing Process*—developed in the Harrisburg plant by Dr. T. Holland Nelson—produces pump liners of highest excellence • The outstanding features of the Nelson-ized liner are that by this new process, the *inner surface* can be raised—for almost any desired depth—to a *Brinell hardness as high as 625;* whereas the *outer surface* can be maintained, for any predetermined depth, with a *Brinell hardness of from 200 to 250* • No operation such as metal spraying, alloy insertions, case hardening or other surface preparation is resorted to. The physical properties and general structure of the material are maintained at the highest possible standard • Liners made by the Nelson-izing Process are unique in that they possess maximum hardness and wear-resistance where most desired, yet this is backed up with material in a tougher, more ductile condition. There is no sharp line of demarcation between the two. In the cross-section of the wall there is a combination of maximum hardness and toughness not obtainable by any other process • Patent covering the Nelson-izing Process has been applied for and assigned to the Harrisburg Steel Corporation.

Greater Resistance to Wear

Harrisburg Pump Liners are forged seamless from steel of special alloy composition, uniform in metallurgical analysis throughout. Every liner is carefully gauged and inspected for precision of diameters and threading, and Rockwelled for hardness, before shipment. Now made by the remarkable Nelson-izing Process, Harrisburg Pump Liners offer the maximum in long, dependable service and consequent operating economy.

HARRISBURG STEEL CORPORATION

HARRISBURG PENNSYLVANIA

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THE question of burner maintenance and repair becomes increasingly important in steel and heat treating plants with the increasing use of modern furnaces utilizing a multiplicity of burners. The large number of burner tunnels and burner blocks to be kept in operating condition makes necessary the use of a refractory particularly suited to the conditions of service, if excessive maintenance costs are to be eliminated and possible furnace shutdowns minimized.

The "Frax" group of burner cements, comprised of "Carbofrax" (silicon carbide) "Alfrax" (fused alumina) "Mullfrax" (electric furnace mullite) and "Mullfrax" S (sillimanite), assure low maintenance cost and satisfactory service from your burner equipment because they have been developed specifically for this purpose, are easily installed and are extremely refractory.

Selection of the proper cement for your particular conditions can be made by our factory representative at our nearest office. Why not ask him to call for a discussion of your problem.

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In High-Finish Grinding—
Get Speed and Uniformity

SPOTTING TRUCK SPRINGS for Brinell tests is only one of many finished grinding jobs you can do faster and more uniformly with Bakelite resinoid bonded abrasive wheels. Tougher, stronger, these wheels operate safely at higher speeds. And their even-wearing, free-cutting **action permits** longer runs without wheel dressing. Write for detailed information in our illustrated booklet 00G, "High Speed Grinding Wheels."

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West Coast.. Electrical Specialty Co., Inc., Los Angeles, San Francisco and Seattle

BAKELITE

The registered trade marks shown above distinguish materials manufactured by Bakelite Corporation. Under the symbol "B" is the numerical sign for infinity, an unlimited quantity, it symbolizes the infinite number of present and future uses of Bakelite Corporation's products.

BONDED WHEELS

VISIT THE BAKELITE EXHIBIT, HALL OF INDUSTRIAL SCIENCE, NEW YORK WORLD'S FAIR 1939

reduces CLEANING COSTS 80%!

NO DUST
CORE RODS RECLAIMED
SAND SALVAGED

SAVINGS

11,500 pounds weight of casting
16,500 pounds weight of cores, rods, etc.
28,000 pounds total weight before cleaning

57 minutes cleaning time by PANGBORN CASTING WASHER
300 minutes cleaning time by former hand process
243 MINUTES SAVED BY USE OF PANGBORN CASTING WASHER

SAFETY

Operator always outside washing room during actual cleaning process . . . away from all water and spray . . . away from danger of being hit by core rods, gaggers, etc. NO DUST OR DIRT. No uncomfortable clothing or water helmets.

MAINTENANCE

Lowest cleaning maintenance. Water is reused over and over. Original supply may be replenished by rain water from roof of building. Sand is salvaged, reconditioned and reused. One company reports a sand saving of $2,000. per year. "Upkeep practically nil" comment of satisfied user after nine years continuous operation. *Write today for information.*

TYPICAL USERS

ALLIS-CHALMERS MFG. CO. Milwaukee, Wisc.
GENERAL ELECTRIC CO. West Lynn, Mass.
AMERICAN LOCOMOTIVE CO. Schenectady, N. Y.
GLEASON WORKS Rochester, N. Y.
BUCYRUS-ERIE CO. S. Milwaukee, Wisc.
MARION STEAM SHOVEL CO. Marion, Ohio
CATERPILLAR TRACTOR CO. Peoria, Ill.
PENN STEEL CASTINGS CO. Chester, Penna.
WATERBURY-FARREL CO. Waterbury, Conn.

NOTE: Find out for yourself what users think of the Pangborn Casting Washer method of cleaning by water. Write NOW to any of the above concerns for first hand user opinion.

PANGBORN

WORLD'S LARGEST MANUFACTURER OF BLAST CLEANING AND DUST CONTROL EQUIPMENT

PANGBORN CORPORATION • HAGERSTOWN, MD.

JUST BETWEEN US TWO

Shocked Pole

This story sounds apocryphal, but it was told to one of our field men by one of the parties involved.

A New England machinery builder recently received an order from a manufacturer in Poland. There was no translation bureau in town so it was difficult to get a Polish translation for the machine's operating instruction plate.

Finally a clerk was located in a local store who said he would be glad to oblige. The plate was made, affixed, and the machine shipped.

Some weeks later back came an indignant letter from Poland, declaring that instead of chaste operating instructions, the plate contained one of the more lurid of the many stories about the incredibly trustful farmer, his attractive daughter, and the traveling salesman.

Invitation

Fortune sent us a courteous letter the other day asking if we, as a subscriber, would care to visit its offices while in New York attending the Fair. We said we would, and promptly received a pass and an assurance of a personal welcome.

This is folksy of *Fortune* and we feel impelled to follow suit, even though our offices are not much to look at, and whenever our visitors exceed one it is necessary to ask one of the stenographers to let us have her chair and do some stand-up list checking until one of the visitors has left.

The old-shoe look of your favorite family journal's offices was planned that way, as we have found that people whose chief business is putting one word after another do their best work when their surroundings are unobtrusive and their minds are not distracted by cold marble and glittering chromium.

You get off the subway at Times Square, elbow your way through the crowd of cloak-and-suiters schmoosing on the corner of 7th Ave. and 39th St., turn right, and there you are.

Awful Terminology

General Motors is now billing intra-company shipments of what is calls "scrap offal" at Iron Age quotations. As we understand it, "offal" consists of clippings of sheets, plates, shapes, etc., large enough to serve as raw material for small parts.

The term grossly maligns the material and GM's publicity department could probably produce a half dozen acceptable euphemisms before you could say Alfred Pritchard Sloan, Jr.

Pet Name Paradise

Bill ("On the Assembly Line", p. 102) Sherman sends us this list of terms used in automobile plants, as collected by *Automotive Facts*, issued by the Automobie Manufacturers Association:

Big Bertha	Dog collar
Hair pin	Tin hat
Snowshoe	Player piano
Percolator	Hay baler
Jack rabbit	Corn popper
Permanent wave machine	Robot
Merry-go-round	Belly band
Fish	Bottle cap
Pancake	Little Percy
Old man	Guess stick
Charlie McCarthy	Major Ironbottom

"Little Percy" is a three-foot pipe wrench; "fish" are lamp guards; the "belly band" supports the transmission; the "permanent wave machine" puts a curl in steel rings; a "Charlie McCarthy" is a wooden model.

"Major Ironbottom" is a casting shaped like the seat of your pants, and is used to test the new sponge rubber seating material. The "Major" is mounted on one end of a lever and cheerfully bounces up and down all day long, tirelessly testing the seat with his seat.

Problem

Take three aspirin, and wrap a wet towel around your head, before tackling this one from J. S. Coldwell, of Globe-Union Inc.:

> Cars A and B are traveling West at 60 m.p.h. Car C is coming East at 80 m.p.h. When Car A is one car length (17 ft.) behind B, A's driver decides to pass B. He accelerates at 2 m.p.h. per second until he is one full length in front of B.
>
> The highway has but two lanes. To allow a margin of one full car length between A and C when A has swung into line again and is one full car length ahead of B, what was the original minimum safe distance between A and C, that is when A was one car length behind B? Disregard the curved path of A in passing.

—A.H.D.